Chemical Age

WIDER USE OF NEW SYNDET MATERIAL URGED

(page 715)

VOL. 83 No. 2129

30 April 1960

THE WEEKLY NEWSPAPER OF THE CHEMICAL INDUSTRY

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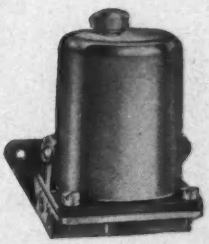
TRANSMISSION CONTROL

"On plant" mercury-in-steel air-operated proportional temperature controller.
Publication No. R39



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VOL. 83 No. 2129
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CHEMICAL AGE

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LIQUID FERTILISERS

THERE is nothing new in the use of liquid fertilisers, for many years bags of soot, manure, etc., have been suspended in butts of water to make so-called liquid manure. Gardeners have used this type of fertiliser for top-dressings applied during crop growth and seldom as a base-dressing before or when seed is sown. By far the largest proportion of fertiliser used in arable farming is, of course, applied before the seed germinates. For this, solid fertilisers have always been used, and it is certainly a strong agronomic argument that the solid type of base dressing is likely to be more efficient. The nutrient content is likely to be slowly released during the period when the young seedling gradually increases its demands.

As in gardening, it might be advantageous to offer top-dressings in liquid forms, but there is a practical difficulty; where the gardener can apply a liquid manually with simple equipment, in farming much more cumbersome application machinery is called for, and this may be almost impossible to use for young crops. Overhead spraying may seem to be the answer, but if a liquid fertiliser is as concentrated as the solid fertilisers that can be used for top-dressings, then it cannot fall on crop foliage without serious risk of scorch damage. The damage caused may far outweigh the benefits of the dressing.

Another agronomic defect of liquid fertilisers is their much greater exposure to loss by soil fixation. This particularly applies to the phosphate in such a fertiliser. The whole of the phosphate is in immediate contact with the soil; this is not so when a solid product is applied, for the phosphate then dissolves from the granule's surface and the plant's needs and soil's fixing capacity compete for the supply.

It is often argued that liquid nitrogen fertilisers are cheaper than solid nitrogen fertilisers. If liquid ammonia or a strong aqueous ammonia solution can be used, there is no need to incur the extra processing costs for converting synthetic ammonia into, say, sulphate of ammonia. This view ignores agronomic risks due to ammonia's volatility. To prevent loss of nitrogen into the air ammoniacal liquids must be injected into the top soil; and, of course, application machines that inject fertilisers are more costly to buy and operate.

A further difficulty in the use of liquid fertilisers in farming is storage. Solid fertilisers can be stacked in bags, moved to the fields in small batches as required; admittedly in factories fluids can often be more easily and economically handled than solid materials, but to convert this advantage so that it applies over the large area of a farm involves considerable investment in equipment for an operation that is conducted only once or twice a year. Additionally, there must be a large tank for central storage; with any use of liquid ammonia, it would need to withstand pressure. In any case it will have a high corrosion risk. Only the very large farm using a substantial tonnage of fertilisers would seem likely to consider this type of capital investment, which even then would be justified only if liquid fertilisers were sufficiently cheaper than solid fertilisers or if they were considerably more efficient. Theoretically, the storage problem on the

farm could be solved if the liquid fertiliser was delivered at the time of requirement in a road-tanker, but the time of fertiliser use is sharply seasonal; it would be economically impossible for the industry or for merchants to have huge fleets of road-tankers able to meet the demands of many farms at about the same time.

In short, any large-scale development of liquid fertilisers in the place of solid fertilisers must face a complexity of difficulties, and there seems to be only one real advantage to be put on the credit side—the lower cost per unit of nitrogen (per 1%) of liquid ammonia as compared with solid nitrogen fertilisers.

Yet against this parade of doubts and defects must be set the modern advance in farm use of liquid fertilisers in the U.S. This is sometimes cited as evidence of technical backwardness on the part of the British industry. It was recently stated that about half the nitrogen fertiliser directly applied to U.S. soils is now used in one or another liquid form. In California just over 25% of the compound fertilisers used are also in liquid form. Altogether there are about 350 mixing plants in the U.S. producing liquid compounds. In contrast to feelings in the U.K., it is said in the U.S. that there are farm advantages through reduced labour and handling costs. However, where the liquid nitrogen fertiliser has made a very large advance—as much as 50% of the total—the mixed liquid fertiliser has to date made a far smaller inroad into the more conventional usage of solids.

This difference is not due simply to the fact that liquid compounds are newer as an idea. Liquid mixed fertilisers cost more to make than solid mixtures. The nitrogen advantage is offset by phosphate and potash disadvantages. Phosphoric acid must be used to provide most or all the phosphate content. If a liquid compound is to have a total nutrient content reasonably comparable with that of solid mixtures, the amount of potash salts—normally potassium chloride—must be able to remain in solution and not be liable to crystallise out in the event of temperature changes. The extent of this problem is indicated by current U.S. studies to develop the use of potassium hydroxide or potassium carbonate; the alkaline disadvantages of these potassium sources would presumably be offset by the acidity of the phosphoric acid used. The development of stable suspensions instead of solutions is also being investigated.

But apart from this technological difficulty, the liquid compound faces higher production costs because its phosphate source is much more costly per unit than the phosphate source for solid compounds; U.S. figures show a difference of as much as 80%. For an intense agriculture, however, the trend of the farm fertiliser demand is for compounds as high in nitrogen content as in phosphate, and as the ratio of $N:P_2O_5$ approaches 1 the cost advantage of nitrogen helps to balance the cost disadvantage of liquid phosphate.

From U.S. figures, given at a South-Eastern States fertiliser industry conference this year, a liquid fertiliser mixing plant has a higher capital cost than one for solid compounding. Per 5,000 tons of output, the liquid plant costs nearly twice as much as a non-granular solid mixing plant. It would make a more practical comparison to bring in the costs of a granular compounding plant, however, and then it is probable that the capital costs would not be as widely different.

Nevertheless in this country the liquid fertiliser has yet to make any appreciable development in farming, and specialised liquid mixtures for commercial glasshouse cropping, though their use in recent years has increased, represent a special case without implications for other kinds of liquid application. Even the more economically attractive use of liquid nitrogen fertilisers has not made progress; field research has not shown it to possess any notable agronomic advantages. The most recently published paper on this subject (H. R. Jameson, *Journal of Agricultural Science*, 1959, **53**, 333-338) concluded that liquid nitrogen fertilisers gave lower grassland yields than solid nitrogen fertilisers and similar yields for wheat, sugar beet and kale. The paper stressed the handling disadvantages of liquid products. There is undoubtedly a vast difference between the British and U.S. outlook towards liquid nitrogen fertilisers.

U.S. TRADE WITH U.S.S.R.

IN the fourth quarter of 1959, the value of U.S. chemicals licensed for export to the U.S.S.R. rose sharply to a total of $1,335,149. These included, in order of importance: isobutyl alcohol ($746,900); styrene monomer ($420,750); epichlorhydrin ($73,400); phosphoric acid catalyst ($32,547); monoethanolamine ($30,755); maleic anhydride ($18,519); ethyl selenac ($4,050); synthetic rubber ($3,628); polypropylene ($2,709); antibiotic feed supplements ($900); chemical reagents ($723); other chemicals and plastics ($223); rubber processing chemicals ($45).

Chemicals approved for export to other Eastern European countries included $690,000 worth of sulphur for Czechoslovakia, phenol worth $213,718 for Hungary and Bulgaria, caprolactam worth $159,000 for Hungary and Romania, and $58,000 worth of synthetic rubber for Poland.

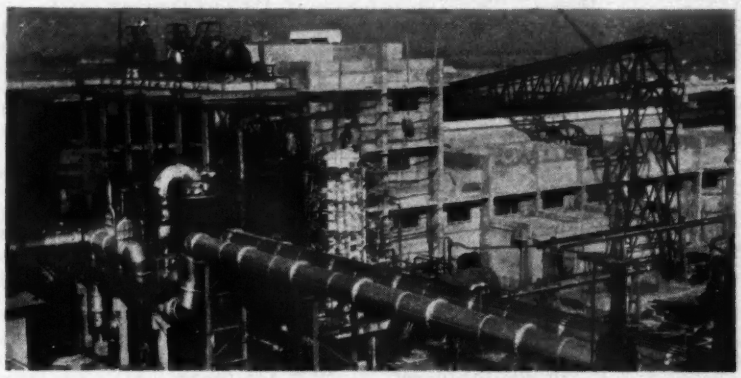
Also revealed by U.S. Secretary of Commerce Frederick H. Mueller is that in addition to the items licensed to Eastern Europe, his department approved a number of applications to transmit technical data relating to the production of such items as plastics, pulp and paper, silicon carbide varistoro, manufactured gas, phosphoric acid, and fertilisers. The U.S. hope that this release of technical information and knowhow will result in contracts, value of which could amount to " many millions of dollars".

At the same time, applications valued at $206,827 were rejected for export to the Soviet Union. Of the more important items, these were fluorinated hydrocarbons, synthetic rubber, a helium cryostat, accessories and insulated shipping containers. With regard to the items rejected for export to other Eastern European countries which totalled $1.2 million, these were mainly chemical and included: borax, boric acid, and razorite to Czechoslovakia; polythene to Bulgaria, East Germany and Romania; synthetic rubber to Bulgaria, Czechoslovakia and Romania; and molybdenum concentrates to East Germany. Also turned down were applications to transmit technical data to the Iron Curtain area, dealing with plants and processes in the petrochemical field, such as ethylene glycol and oxide, polythene, and maleic and phthalic anhydride.

The U.S. Commerce Department seems to be taking a more favourable attitude towards U.S.-Eastern European trade but although trade is growing slowly it is still small—U.S. exports to Eastern Europe in the third quarter of 1959 at $40 million was only nine-tenths of 1% of total exports, but compared favourably with $10 million in the second quarter of last year. U.S. imports from the Soviet bloc are also noted to be increasing—$21.3 million in the third quarter of 1959 as against $18.5 million in the second quarter of 1959 and $19.8 million in the third quarter of 1958. The U.S.S.R. and other Eastern European countries in the first nine months of last year sold in order of importance (i.e. in terms of $ value) to the U.S. benzene, platinum, chrome ore, palladium, naphthalene and pyridine.

Project News

Durgapur Sulphate of Ammonia Plant on Stream



Sulphate of ammonia plant at Durgapur

THE sulphate of ammonia plant at the Durgapur steelworks, designed and built by Simon-Carves Ltd. who are also handling the benzole rectification unit referred to last week in p. 680, has gone into production. The plant utilises coke-oven gas for the production of ammonium crystals. Rated capacity is 57 tons of ammonium sulphate a day, from 2 million cu. ft. of gas.

The crystals are formed in a saturator bath and are then ejected automatically to a continuously discharging centrifuge for preliminary drying. They are fed by conveyor to a rotary hot air dryer and are then automatically weighed into bags ready for sale. A comprehensive instrumentation system ensures automatic control.

A coal washery at Durgapur, now in production with a 360-tons/hour capacity, was also designed and built by Simon-Carves, a member of Iscon, the U.K. consortium that is building the Durgapur steelworks.

P.G. to Engineer Monomer Plant for British Geon

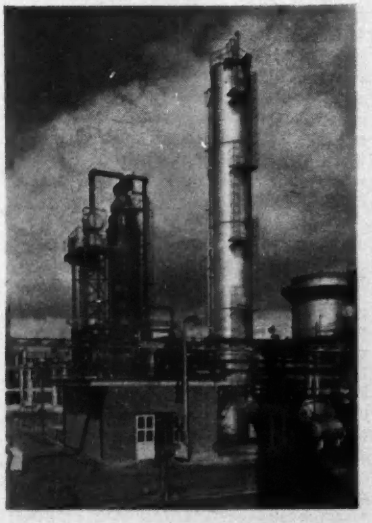
● ENGINEERING, design and procurement of a monomer plant and external services is to be handled by P. G. Engineering, Stockton-on-Tees, a member of the Power-Gas Group, as a major stage in the Distillers Company's project for the production of p.v.c. This contract forms part of British Geon's £2 million expansion plant at Barry, South Wales, which is expected to be completed in the second half of next year (see also 'Project News,' 2 April, p. 563). D. C. L. Engineering Division will supervise construction of the p.v.c. project.

S.B.A. to Construct Nitric Acid Plant in Lorraine

● SOCIETE BELGE de l'Azote et des Produits Chimiques du Marly (S.B.A.), Liège, have just been entrusted by Houilleres du Bassin de Lorraine with the construction at Carling (Lorraine) of a unit producing nitric acid at 70%. This unit, which is part of an important carbochemical development programme, carried out at Carling by this French concern, is the second one erected by S.B.A. for that company and is S.B.A.'s 16th nitric acid plant.

W. C. Holmes' Work on Benzole Recovery Plant

● BENZOLE recovery and desulphurising plant installed at the Isle of Grain Works of the South Eastern Gas Board, by the Chemical Engineering Division of W. C. Holmes and Co. Ltd., is one of 47 similar units designed and constructed by the division. It operates on gas produced by the Segas process.



Benzole recovery and desulphurising plant installed at the Isle of Grain by the South Eastern Gas Board

An interesting feature is the inclusion of a naphthalene stripping section in the main vacuum still, the section dealing with the oil from a naphthalene washer on another part of the plant. A further feature is the use of a steam jet vacuum pump as a stand-by to the main rotary vacuum pump.

Cochran Build Pressure Vessel for Pemex

● A CONTRACT for the construction of the largest pressure vessel in the world was placed recently with Cochran and Co., Annan, Ltd., Dumfriesshire, Scotland. The vessel will be some 212 ft long and 12 ft in diameter and will weigh over 150 tons. It will be made in four sections and each section will be sent out separately from Glasgow for export to Mexico.

The order was placed by Petroleos Mexicanos in connection with an engineering contract with Fluor Engineering and Construction Ltd., Finwell House, Finsbury Square, London E.C.1, for extensions to the Minatitlan Refinery in Mexico. The order is worth over £30,000 and despatch will be made sometime in June.

Simon-Carves Acid Plant for H. M. Goulding

● A CONTRACT has been placed by W. and H. M. Goulding Ltd., fertiliser manufacturers, Ireland, with Simon-Carves Ltd. for a further sulphuric acid plant of over 200 tons/day capacity. The plant will be located in the Dublin area and is expected to be completed in the summer of 1961. Goulding's similar project at Cork, also engineered by Simon-Carves, is now nearing completion.

Fall in Capital Spending for U.K. Chemicals

FIXED capital expenditure in the U.K. chemicals and allied industries in the third quarter of 1959 totalled £31.6 million, the lowest third-quarter figure since 1955 and £8.3 million below the second quarter figure. The following is an abstract from the *Board of Trade Journal*, 15 April, p. 831 3:

Capital Spending in £ million

	1st Qrt.	2nd Qtr.	3rd Qtr.	4th Qtr.	Year
1954	—	—	—	—	112.1
1955	22.9	25.8	28.7	38.8	116.2
1956	34.9	34.5	40.6	49.3	141.3
1957	45.4	48.0	47.7	54.5	195.6
1958	50.7	50.5	48.3	55.5	205.0
1959	41.5	39.9	31.6		

Obituary

Mr. Francis J. Curtis, former vice-president and director of Monsanto Chemical Co., St. Louis, U.S., died in St. Louis on 21 April, aged 65. President of the Society of Chemical Industry in 1952-53, he was also a president of the American Institute of Chemical Engineers, and last November received the Founders' Award for his outstanding contributions to chemical engineering. Mr. Curtis became a vice-president of Monsanto in 1943 and joined the board in 1950.

THE next few weeks will be vital so far as the future of the Common Market 'Six' and the E.F.T.A. 'Outer Seven' are concerned. On 10 May, the Six are due to meet in Luxemburg to approve the Hallstein proposals to speed-up the C.M. timetable. Such a step would inevitably widen the breach between economic division of Europe.

At the Hanover Fair, last week-end, Dr. Erhard, Economics Minister of West Germany, hinted that his Government had reached a decision on the Hallstein plan. He would not say what this was but did state that they had gained time in order to further negotiations between the Six and Seven before the C.M. timetable is accelerated. He thought this vital to prevent avoidable tension and to avert damage to any of the economies involved.

At the same Fair, German industrialists put forward the proposal that the C.M. countries should join the E.F.T.A. That would preserve the structure of the Common Market and yet would achieve the larger European free trade area originally envisaged. Such a step would be ideal from many viewpoints—if only to remove uncertainty about future tariffs. Experience has shown, however, that it would not lightly prove acceptable to all the six countries. At least it might prove a valuable debating point in coming discussions.

A NEW use for p.v.c. sheeting, representing one of the largest pieces of plastics sheeting made in this country, has been the creation of a lagoon at Brad Sands in the tipping area of I.C.I. Wilton Works. Measuring 160 ft. by 90 ft. it required 24 men to unroll and secure the waterproof lining.

The 'lagoon' will be used for the temporary storage of effluent from the three olefin plants. On occasions the incinerator capacity has been insufficient to cope with the amount of combustible waste produced. I learn from *Wilton News*, the works newspaper, that full efficiency value is put at five years. It is impossible to forecast the lagoon's durability with safety beyond that period since the data available on what is a relatively new development is limited.

Associated in the project are the technical sales department of I.C.I. Plastics Division, Commercial Plastics Ltd., Newcastle upon Tyne, and Stephens Plastics Ltd., Corsham, Wilts.

I NOTE from contemporary American journals the recent death of Dr. T. D. Spies, a world authority on deficiency diseases, who in 1954 discovered that nicotinic acid was a specific in the treatment of pellagra. As a result of his work this affliction has been virtually eliminated.

Medicine owes much to Dr. Spies, whose work at Hillman Hospital, Birmingham, Ala., also led to successful treatment of other vitamin deficiency diseases such as riboflavin in beri-beri, folic acid in sprue and vitamin B_{12} in pernicious anæmia. At the time of his death he was Professor of Nutrition and Metabolism at the North-western University Medical School, Chicago.

CAN a chemical plant be pretty? I should have thought not, but a contemporary U.S. journal says that of the $1,640 million that the U.S. industry is expected to spend for new plant, construction this year, $10-20 million will be spent on 'beauty treatment'. Presumably that spending is scheduled for laying-out and maintaining lawns, tree planting, colour-finishes for process plant, colour-finished curtain walling, etc.

Some plants, of course, do not need such treatment. Dow Chemical's new Plaquemine plant is said to retain the original Louisiana plantation house; Cyanamid employees at Fortier gather pecans from the old plantation's trees; Du Pont designed their Parkersburg, W. Va., plant in colonial style in keeping with local history (I wonder how they achieved this). The Wallingford, Conn., site of Cyanamid must be unique for it maintains an historical cemetery!

Fawley can compete with its New Forest setting. Grangemouth, and in the future, I.C.I.'s Severnside works can claim beautiful surroundings; I.C.I. Wilton and Shellhaven are good examples of U.K. plant 'beautification'. There are many advantages in attractive plant layout not only in employee morale and the encouragement of good house-keeping practices, but also in local community relations. I should like to know, however, what, if anything, could be done with some of our older sites, such as Billingham, Oldbury, Runcorn or Widnes.

OUR leader last week showed a research and development spending per qualified worker for I.C.I. of £2,671—well below the chemical industry average of £6,655, disclosed in the D.S.I.R. report on research spending. This must have given the impression that the company was either incredibly mean towards its research staff or that it had a phenomenal rate of efficiency!

Neither is true. Our figure was erroneously based on I.C.I. having a qualified research and development staff of 3,500 persons; this figure in fact relates to the whole company and, of course, includes many qualified staff who work in administration and sales, as well as on the production side. No official figure of qualified staff working on research and development in I.C.I. is available, but the number is close enough to 2,000 to allow that figure to be used to calculate the cost to the company of research and development for each qualified worker. With a total R. and D. spending last year of £14.2 million and qualified R. and D. staff of 2,000, the cost per qualified worker is in the £7,000 region—which compares with the chemical industry average of £6,655 given in the D.S.I.R. report.

PUBLICATION of a rumour in our U.S. contemporary journal *Chemical Week* a month ago to the effect that British Petroleum were thought to be planning, in conjunction with the Oronite Chemical Corporation of the U.S., to set up plants in Britain and West Germany for the production of aromatics, has been followed by more recent publication in the *Financial Times*. The F.T. headline —'B.P. and Oronite join in £9 million Project'—suggests that this is an 'inspired leak' rather than mere speculation.

No comment is available either from B.P. or British Hydrocarbon Chemicals, the joint B.P.-Distillers subsidiary, who already have a U.K. link with Oronite. Grange Chemicals, sited at Grangemouth, have one-third of their capital owned by Oronite, a subsidiary of Standard Oil, and two-thirds by B.H.C. In addition Distillers and Oronite jointly own Orobis Ltd., who produce oil additives at Hull.

The aromatics concerned are alleged to be *o*- and *p*-xylenes, benzene and ethyl benzene. The story has it that construction will start before the year-end.

Such 'inspired leaks' are almost inevitable when more than one company is concerned in a project. Various executives in the companies concerned have to approve the official press release which is supposed to give first news of the scheme. This usually takes some weeks, particularly if overseas firms are involved. In the meantime contractors and subcontractors are appointed and in no time at all what the sponsors believe to be a closely guarded secret is a piece of public knowledge!

HIS many friends throughout the chemical industry will have learned with regret of the enforced retirement, through ill-health, of Mr. J. M. Rimington, managing director of the Chemical Division of the Distillers Company Ltd. When he retired at the beginning of this month he had been with the company for 30 years.

A popular figure in the industry, Mr. Rimington's wise counsel will be missed by his colleagues both in Distillers and in association circles. I join with all those who have wished him better health in his retirement.

Alembic

SYNDET COMMITTEE URGES WIDER USE OF NEW MATERIAL

Large-scale Production by Shell Chemical

LARGE-SCALE trial of an alternative detergent material, more readily decomposed biologically than that now in general use, had shown that while the new material was not completely removed during sewage treatment, its substitution for the material now in general use would substantially diminish the troubles associated with synthetic detergents. This 'tentative conclusion' is reported in the third progress report of the Ministry of Housing's Standing Technical Committee on Synthetic Detergents (H.M.S.O., 1s 6d net).

Two new methods both based on i.r. spectroscopy, have been devised to estimate the proportion of old and new material in settled sewage.

The alternative alkyl benzene sulphonate was claimed by the manufacturers to be more amendable to biological oxidation ('biologically soft') than the ones in general use. Experiments by the Metropolitan Water Board and the Government Chemist's Laboratory had supported that claim, which had been further confirmed in pilot-scale sewage treatment plants at the Water Pollution Research Laboratory. Under comparable conditions with both activated sludge and biological filters, 94% of the new material was destroyed, compared with 68% of the old material.

(The new detergent raw material was developed in Shell research laboratories and is manufactured by the Shell Chemical Co. Ltd. Steps have already been taken to manufacture substantial quantities of the new material at Shellhaven. This has been achieved by modifications to the existing large-scale plant.)

Full-Scale Trial

The manufacturers then suggested that the value of the new material might be assessed with greater confidence by a full-scale trial in a suitable area. The major companies, responsible for more than 95% of the packaged syndets, agreed to participate. The trial was made in the upper valley of the River Lee, in which Luton and Harpenden are situated.

Luton with a population of about 110,000 and a daily dry weather sewage flow of about 9 million gall. treats sewage by two stages of sedimentation, partial purification by activated sludge treatment, biological filtration, settlement in humus tanks and either sand filtration or microstaining. This produces an effluent of unusually high quality.

Detergents based on the new material were supplied to the Luton area on 1 August 1958. During 1959 there was a marked reduction in the concentration of surface active agent in the Lee, which is one of the sources of London's water supply. The following table shows the detergent content of the river at Hertingfordbury Park:

MONTHLY AVERAGES OF WEEKLY SAMPLES

	Detergent Content as Manoxol O.T.			
	Concentration in p.p.m.		Quantity in lb. per day	
	1958	1959	1958	1959
April	1.7	0.9	312	243
May	1.4	0.8	272	156
June	1.2	0.9	207	136
July	1.3	1.0	225	140
August	1.4	0.8	227	121
September ...	1.4	1.1	212	131
Arithmetical averages ...	1.4	0.9	243	155

These results show there has been a genuine reduction in the quantity of surfactants carried by the Lee at this point since the experiment started.

The pilot-scale tests had led to the hope that the residual syndet content of Luton sewage effluent might be cut to less than 1 p.p.m., and that foam might be reduced to negligible proportions. It became clear by July last that the proportion of new detergent being used in Luton was not more than 70% and still not enough to demonstrate whether or not foaming could be eliminated by complete replacement of the old material. All the manufacturers are now extending their distribution areas of the new material in an attempt to reduce the entry of old material into the town. The results of these extensions are now awaited and the observations at Luton are being continued.

Some Uncertainty

The experiment has confirmed that the new material is more completely oxidisable than the old. Part of the new material is destroyed quickly but a proportion of the remainder seems to be decomposed only slowly and with some difficulty, so that even at Luton, where an effluent of exceptionally good quality is produced, sometimes at least a proportion of the new material leaves the works.

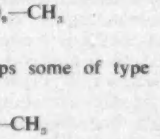
The committee's tentative view is that replacement of the old material by the new throughout the country would substantially diminish the troubles that increased use of syndets has caused. It is as yet uncertain, however, whether it would provide as complete an answer as the committee could have wished. Further research by the manufacturers continues; meanwhile general adoption of the new material in preference to the old would undoubtedly bring about an improvement.

Analytical Methods. When the trials started there was no method for determining the new and old materials independently. It was not easy to discriminate between the two types when present together in sewage, for they differed not so much in composition as in the internal arrangements of the constituent atoms in the molecule. Also in sewages and effluents various other substances interfered with analysis of the syndets.

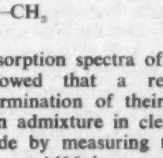
Infra-red spectroscopy showed that the alkylate which was the basis of the former material was composed of a mixture of mono-substituted benzenes, the alkyl substituent of which was highly branched. There was no evidence of the presence of methylene chains exceeding three carbon atoms in length. The sulphonate was essentially para-substituted tertiary alkyl benzene sulphonate.

The new material was found to have less branched alkyl chains than the old and there was good evidence of the presence of methylene chains exceeding three carbon atoms in length. It appeared to be of the secondary alkyl benzene type with a small proportion of tertiary compounds also present.

The new alkylate contains, among others, compounds with structures such as:



with perhaps some of type



The i.r. absorption spectra of the two materials showed that a reasonably accurate determination of their relative proportions in admixture in clean water could be made by measuring the ratio of absorbances at 1406^{-1} cm. and 1396^{-1} cm. To determine the relative proportions of both in sewage and sewage effluents it was necessary to obtain them in a form comparatively free from interfering substances. The first state consisted of concentrating and partially purifying the detergent by foam formation induced by passing a fine stream of nitrogen bubbles through the liquid.

In the second stage, the condensed foam is strongly acidified and extracted with chloroform. After evaporation, further purification is effected by dissolving the material in carbon tetrachloride and extracting into water.

Determination Method

A method for determining both old and new materials in sewage was developed. The detergent is concentrated by adsorption on a carbon column from which it is desorbed and purified by acidification and successive solvent extractions. The detergent is complexed with 1-methylheptylamine and again extracted. The i.r. adsorption at 1368^{-1} cm. enables the old detergent material to be determined and the mean of the adsorptions at 1044^{-1} cm. and 1010^{-1} cm. gives the total detergent content.

Work is now being carried out on the development of an absolute reference method of analysis which is completely specific for alkyl benzene sulphonate and accurate for concentrations well below 1 p.p.m.

Production Data. The following table

brings up to date information contained in the first report:

UK CONSUMPTION OF SURFACE ACTIVE MATERIAL

('000 tons)

	Domestic	Industrial	Total
1949	10.5	2.5	13.0
1955	34.0	6.5	40.5
1956	34.5	6.5	41.0
1957	34.1	6.9	41.0
1958	35.0	7.3	42.3
1959	37.5	7.4	44.9

The increase during the past two years had largely been due to a greater use of synthetic detergents in liquid form and estimates of consumption are given in the report. The quantities of resistant materials are small compared with those used annually in detergent powders and cannot as yet have had any appreciable effect on the overall position, but it is most desirable, states the committee, that in formulating these products, manufacturers should avoid the use of those active materials which give trouble in sewage works and rivers.

ESTIMATED UK CONSUMPTION OF LIQUID DETERGENTS, 1958

('000 tons)

Alkyl sulphates primary	0.48
Alkyl sulphates secondary	1.52
Alkyl benzene sulphonate:	
Alkyl biologically hard sulphonate	0.51
Alkyl biologically soft sulphonate	0.71
Nonionics	0.98
Total active matter	4.2

Accurate, Precise and Fast Methods Now Available for Fertiliser Analysis

TWO symposia, dealing with related subjects, were held at Church House, London, last week. The first, which opened on 20 April, was organised by the Society of Chemical Industry and was devoted to "Advances in the chemical analysis of fertilisers, soils and plants". Its second and final day coincided with the first sessions of a joint symposium arranged by The Fertiliser Society and The Society for Analytical Chemistry with papers on fertiliser analysis.

The S.A.C.-F.S. symposium discussed the results of the collaborative work on fertiliser analysis carried out by chemists in the fertiliser industry during the past 10 years. The work began when, in 1947, the council of the Fertiliser Manufacturers' Association initiated a consideration of the methods of analysis in the 1932 regulations made under the Fertilisers and Feeding Stuffs Act, 1926, and invited recommendations for their revision. In 1954, the Scientific Sub-committee of the Ministry of Agriculture, Fisheries and Food invited the Society for Analytical Chemistry to draw up methods of analysis for a number of trace elements in fertilisers and feeding stuffs.

The work fell naturally into two sections: the determination of trace elements has been investigated by the trace elements in fertilisers and feeding stuffs sub-committee of the S.A.C. Analytical Methods Committee, and the determination of the major fertilising elements—nitrogen, phosphorus and potassium—has been investigated by the F.M.A. chemists' sub-committee under the routine check analysis scheme.

Sixty or so elements have been identified in the ash of plants. Many of the trace elements are known to be essential; some may be deleterious. Those for which methods were described were molybdenum, iodine, fluorine, cobalt, copper, boron, magnesium, manganese, zinc, iron, chromium and nickel. Selenium also had been studied, but no method had been found suitable for the very low levels involved.

In his paper, 'Fertiliser analysis—a decade of collaborative investigation,' Dr. J. H. Hamence, S.A.C. past president, said that with the new trading agreements the question of international methods assumed an increasing importance. As he saw the position today the principal objection raised by their neighbours on the Continent in the past for the adoption of English methods as international ones, was that they had always been very time consuming. Now at last accurate, precise and rapid methods were available for the determination of both phosphorus and potassium. The methods also had the advantage that they had been examined by a wide circle of agricultural chemists.

Their value for the task in hand would, in his opinion, be amply demonstrated by the results which would be described by subsequent speakers and it was his earnest desire that the body concerned with the formulation of international methods would give the Wilson volumetric method, or possibly its gravimetric modification, and the Perrin method for potassium, sincere consideration for their adoption as international methods. He also hoped that copies of the papers presented at the meeting would be sent for their consideration.

Great Changes Forecast at I.C.I. Billingham

GREAT changes to come within the next three or four years at I.C.I.'s Billingham Division were referred to by Mr. W. d'Leny, the division technical managing director, at a recent presentation of long-service awards.

For the main division process, that of making synthesis gas, it had been decided to wait until they were certain they had a process which would stand competition from any other in the world. They were confident now that they had that process and they were beginning to get down to details of what he would like to call "the new Billingham", That "new Billingham" would be seen rising in the physical sense in about 18 months, but the great change would be within three to four years.

A lot of work in the planning stages had gone into the Billingham project to produce ammonia and associated projects at Severnside in the last three or four years.

The development would probably have come along sooner, but for the Monopolies Commission's study of the fertiliser industry. That had made the I.C.I. main board a little reluctant to go ahead. As soon as the company had been given a clean sheet from the Commission, it at once sanctioned the ammonia development at Severnside.

Last week Mr. W. J. V. Ward, Billingham chairman, said that British farmers were using more fertilisers this year than ever before. The division needed every ton of fertiliser it could make and had sold pretty nearly all of its make. Roughly twice as much nitrogen was now being sold in this country as at the end of the war. About 60% of the nitrogen sold was now in compounds, such as their C.C.F., and not as sulphate or Nitrochalk.

They were gradually changing at Billingham so that they could make considerably more of their output in the form of compounds. That was the reason of the new extension on the Haverton Hill road—to raise output by about 50%.

Durham Chemicals Commission Phthalate Ester Plant

ERECTION and commissioning of a phthalate ester plant for the manufacture of plasticisers for p.v.c. products has extended the manufacturing facilities at the Durham Chemical Group at Birtley, Co. Durham. Durham Raw Materials Ltd., 1-4 Great Tower Street, London E.C.3, Sales Division of the group, now offers p.v.c. plasticisers in addition to their present series of Durostabe solid stabilisers and Nuostabe liquid stabilisers; the latter being a product of Nuodex Ltd.

The new phthalate ester plant follows the commissioning of plant for liquid stabilisers and paint additives as part of an overall programme to provide supplies of processing chemicals for the paint and thermoplastics manufacturing industries, both of which are of growing importance.

Araldite-based Silver Preparations from J.M.

RESEARCH work by Johnson, Matthey and Co. Ltd., Hatton Garden, London E.C.1, carried out in collaboration with CIBA (A.R.L.) Ltd., Duxford, has led to the development of two additions to the J.M.C. range of thermosetting silver preparations. Both these preparations, based on Araldite, are protected by British Patent 716243.

FSP43 is a surface-coating preparation for application by brushing: FSP49 is a conducting cement. Each is supplied in the form of two separate components which are mixed immediately before use.

The mixed components must be cured at a minimum temperature of 80°C and will adhere to most materials that are capable of withstanding this temperature, including glasses, ceramics, graphites and many plastics. The films, after curing, are extremely hard, have high electrical conductivities and are highly resistant to water and organic solvents.

GOOD START TO 1960 FOR I.C.I. HEAVY ORGANICS WITH NEW PRODUCTS PLANNED

"QUITE high demands" marked the beginning of this year for the I.C.I. Heavy Organic Chemicals Division and already the division was in a much better position than at the same time last year. This was stated by Dr. S. W. Saunders, division chairman, at a recent meeting of Oil Works and Olefin Works Councils at Wilton. Dr. Saunders added "There is no reason why that should not continue".

He stressed the division's intention to develop more products. The future of most of their products was "not too bad", but that was not good enough. If they did not develop new products, other people would get in first and once they were in a market it would be difficult to push them out. That was why H.O.C. Division would increase its research and development as fast as it could.

Policy on Ethylene

In connection with the recent decision to make ethylene oxide and glycol at Severnside Works—with ethylene piped from Esso Fawley—the question was being asked as to why I.C.I. should buy ethylene as one of their raw materials for the new plant instead of making it. It seemed the best thing to do for the products required and for the quantities involved. Did that mean I.C.I. would not make ethylene any more? Dr. Saunders said that it did not necessarily mean that, for what happened in the future would depend on conditions.

They believed that at Severnside they should go on expanding and when they wanted more ethylene and more of other things then that would be the time for I.C.I. to take another look to see if it would be worth while making the cracker products or buying them.

In addition to the Billingham project to build a 100,000 tons-a-year ammonia plant at Severnside, other divisions were contemplating building plants there. When Severnside started growing it would grow fairly fast.

Progress at Severnside. Mr. J. D. Brown, division engineering director, at the recent H.O.C. chairman's meeting at Wilton said that road alterations were already in hand by the local authority at Severnside in order to get materials in and out. Preliminary work on site roads and drainage had passed the design stage and the contract was about ready so that the civil contractor could go ahead, possibly within the next month.

Main feature of the design of the ethylene oxide plant had been agreed with the U.S. company (Scientific Design) whose process it was. Final estimates and plans were expected to be ready by the end of April. It was hoped that detail design would be going full ahead by the end of May and that construction of the plant would start in August to September. Completion was expected by the end of 1961. Plans for the glycol plant, which the division engineering department were designing themselves, were at about the same stage.

H.O.C. Production. Despite rising output, the division could sell more than it could make, declared Dr. C. Cockram, H.O.C. Division production director. Detailing some of the 1959 highlights, he mentioned para-xylene and butadiene where much patient work had pushed up output to well over flowsheet.

The division preferred to sell all the ethylene it could for polythene but ethylene oxide and glycol were still being made. A new oxide plant venture was the production of propylene oxide and glycol. With those products, Dyestuffs Division was being helped to get into the foamed polymer field. When the new Severnside EO plant was on stream, it was expected to use the Wilton plant entirely for propylene oxide.

Much progress had been made on phenol and its products. The plant had been worked for short periods at very high rates. Solution of some remaining technical problems could make the picture for phenol look very much better.

Durham Chemical M.D. Pleads for Inter-Firm Comparisons of Technical Ratios

A GOOD case could be made out for inter-firm comparisons of technical ratios where the costs of particular sections of works could be segregated, although in the chemical industry there were so many diverse products of such different costs and margins that inter-firm comparisons of financial ratios might be misleading rather than helpful. This was stated by Dr. F. L. Gilbert, F.R.I.C., managing director of the Durham Chemical Group Ltd. in a paper entitled 'Keeping an eye on costs' at the northern management conference held last week by the British Institute of Management.

Dr. Gilbert said there were many trade associations where companies making similar products combined for rationalisation of research programmes, supervision of communally supported sponsored research, investigation into new outlets for their products, joint representation to Government Departments, etc. There seemed to be, therefore, an admirable opportunity for comparing notes on the cost ratios of common stages in the technology of the product without disclosing a company's own expertise.

For instance, ratio of labour cost to product cost; ratio of raw material cost to product cost; cost of fuel per production unit. One could know whether one's own company was above or below average or was near the top or bottom of the list (according to the precise method used) and could thus take steps to examine some particular activity knowing that a competitor was doing better but not knowing quite how.

That could also apply on a wider scale to such common service costs as electric power generation and steam raising. Here then might be an opportunity of keeping an eye on costs nationally as well as in private enterprise.

In his paper Dr. Gilbert stressed the vital importance of purchasing in the economics of running a small or medium chemical company. In heavy chemicals, raw materials could represent between 75% to more than 85% of the selling price. That left between 15% and 25% for all other costs—processing, packing, freight, selling, administration and profit.

Careful study of all aspects of purchasing could save much money. If raw materials delivered into store cost 80% of the final product cost, then a 2% saving in purchasing (i.e. a saving of less than the usual 2½% for cash) would be as valuable as an 8% saving in general processing and overheads. The efficiency, therefore, of a purchasing department could have a greater effect on profitability than any other single department.

Two other large departments which should not be left out of cost considerations were research and development, and maintenance. Dr. Gilbert then described the setting up of a cost system and its importance to a firm.

No Higher Import Duty on Monosodium Glutamate

Following an application received 13 months ago for a higher import duty on sodium hydrogen glutamate, the Board of Trade now states that a case has not been made out for such an increase. The application has therefore been rejected.

Seven Point Rise in Chemical Production Index

Index of industrial production for the chemicals and allied industries was at average of 128 in 1959 (compared with 115 in 1958 and 100 in 1954). The 1959 figure for coke ovens, oil refineries, etc., was 127 (116 in 1958) and for general chemicals, 128 (115 in 1958).

Colourspun Acrilan is First U.K. Dope-dyed Acrylic

Following their recent announcement of the availability of dope-dyed Acrilan in charcoal and slate, Chemstrand Ltd. are now producing colourspun Acrilan in a wide variety of colours and shades. The first dope-dyed acrylic fibre to be produced in Britain, colourspun Acrilan is now available in sampling quantities in 3 denier 2 in. and 4½ in. staple in black, bronze, Sherwood green, blue/green, light, medium and dark blue. Samples of silver will be available shortly.

NEW WORKS LAYOUT RAISES Q. AND Q. OUTPUT BY 30%

In the lamp work assembly shop. A counter current liquid/liquid extraction tube-making rig is seen in the foreground

APPLICATION of modern techniques to what has previously been regarded as a hand craft, is how the managing director of Quickfit and Quartz Ltd., Mr. Brian Turpin, described the company's £80,000 re-organisation and mechanisation carried out over the past two years.

A new factory layout and production system showing output improvement in the region of 30% at the Stone, Staffordshire, plant, is designed to maintain Q and Q's position as a leading supplier of interchangeable laboratory glassware, as well as to avert increases in prices (which have hardly changed since the war).

The programme has been carried out by a team under the leadership of the works director, Mr. E. S. Pearse, and Mr. D. Curtis, research director in charge of the development department, and its significance is considered by the company to epitomise advances made in the industry as a whole.

The development department is concerned with production methods, and with design of new laboratory apparatus. Here, also, research is carried out into new methods, commencing with pilot-scale plant.

In the mechanical joint-forming section the raw material, consisting of glass tubes, is converted into various forms by manipulation in oxy-coal gas flames. Components are then fed on conveyor belts to an inspection unit, where each is inspected. This section is organised to process from 10,000 to 12,000 items per day.

The joint-grinding section is a battery of five semi-automatic joint-grinding machines—designed and built by the company, each grinding six joints simultaneously. The production unit of five machines is designed for mass grinding of long runs. For smaller runs there are individual hand-grinding benches.

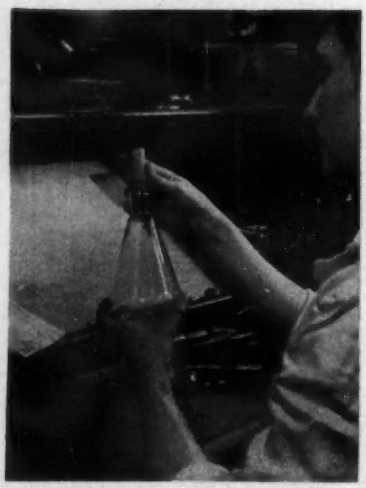
The finished products go to the packaging department where Q and Q have recently introduced a number of improvements in quality and appearance of wrap. Proportion of orders is 60% U.K. to 40% export sales. Percentage of oversea sales is increasing, while overall sales for January of this year show a 40% increase over the same period last year.

The chemical industry is the largest consumer of such laboratory glassware and it is the fine-chemical manufacturers who use it most of all. These include perfumery and essence distillers and manufacturing chemists. Every large fine-chemical manufacturing house in the country is among Quickfit and Quartz customers, as are the Ministry of Health, the Medical Research Council, the Agricultural Research Council, the Department of Scientific and Industrial Research, the Atomic Energy Authority and other research bodies.

Apart from glass, other principal supplies to the factory are oxygen and coal gas. A Coval converter with a capacity (of evaporated oxygen) of 125,000 cu. ft., —three days' supply, has recently been installed.

Germany, Canada, Australia, Holland, India, South Africa and the Scandinavian countries are outstanding custobers of the firm. French and Italian markets are reported to be developing, a fairly healthy export trade is being carried on with Switzerland and Belgium, and a development programme to further exports to Russia and America is well under way.

All the company's apparatus is completely interchangeable, and units can be assembled to make a great many different pieces of apparatus, from semi-micro equipment, a set of which comprises all necessary components for carrying out standard organic laboratory tests, to the larger-scale laboratory equipment suitable also for small-scale production.



Inspecting a socket for conformity to B.S.I. dimensions in the Stone (Staffs) factory of Quickfit and Quartz Ltd.

First Textile Dyestuffs and Chemicals Exhibition

The first International Textile Dyestuffs, Finishes and Auxiliaries' exhibition is to be held at he Free Trade Hall, Manchester, on 22 and 23 September. In addition to the exhibition, there will be a programme of films shown by manufacturing companies and on one of the days, a symposium relating to new developments in textile chemicals. The Exhibition will be held yearly, returning to Manchester every three years. The intervening two years the Exhibition will be staged in Yorkshire (1961) and London (1962).

Additives for Industrial and Marine Boilers

A NEW powder additive in a soot stick form for the treatment of boilers is being produced by the Amber Chemical Company Ltd., 11a Albemarle Street, London W.1, a member of the Amber Group. The combustion additive, Amber SSR 117, can be used for the treatment of all types of marine or industrial boilers, using either liquid or solid fuels.

It enables boilers to be operated at maximum efficiency, reducing the frequency of tube-cleaning, with a resultant saving in maintenance time and labour costs. Heat transfer is increased and the combined advantages of the additive enable boilers to be satisfactorily operated over longer periods of time.

The tubular injector cartons, each containing ½ lb. additive, are thrust through the inspection ports of the boiler for good distribution over the fire-bed.

Further data is now available on Amber SSR 511, a marine fuel oil treatment, manufactured by Amber Chemical and designed primarily to overcome sludge and other problems associated with the burning of heavy fuel oil. It dissolves existing sludge in tanks and prevents further sludge formation. It keeps fuel oil heaters clean and by improving atomisation, ensures better combustion.

Mr. James Fairlie, late director of H. C. Fairlie and Co. Ltd., Camelon Chemical Works, Falkirk, who died on 2 March, aged 87, left personal estate valued at £132,310.

EQUIPMENT NEWS

Chemical Plant: Laboratory Apparatus: Handling and Control Equipment

AUTOMATIC ELECTRONIC BLENDER

FULLY automatic, continuous and highly accurate blending is claimed for the C.J.B. Electronic Autoblender produced by the automatic control division of **Constructors John Brown Ltd.**, Seagrave Road, London S.W.6. The installation is on the unit principle with one master control unit and one component control unit for each component. The blender control panel can be placed anywhere within a half-mile radius of the blender manifold components.

There are no moving parts in the control units which employ proven electronic techniques. The electronic circuit is fully transistorised and, for ease of maintenance, is divided into a number of printed circuit plug-in cards, with built-in checking facilities.

Advantages claimed for the Autoblender include reduction of tank requirements, as no blending tanks are needed, and saving of time since a blend can be set up in a matter of minutes and can immediately be discharged into shipping tanks. Low initial cost is also accompanied by lower labour costs in view of the centralised control.

The system uses a positive displacement flow meter and a centrifugal supply pump for each component. Other combinations incorporating turbine type meters and variable output positive displacement pumps are possible. Accuracies of better than .25% are given as the usual achievements with up to 10 blend components controlled from one master oscillator.

MANUAL POLAROGRAPH

A manual polarograph A1650, produced by Southern Instruments Ltd., Camberley, Surrey, is equipped with "click stop" adjustment and the use of a fairly short period galvanometer allows high operating speed. Controls have been kept to the minimum

FISHER SUB-SIEVE SIZER

ON the right is a working diagram of the Fisher sub-sieve sizer, available in the U.K. through **Kek Ltd.**, Palmerston Street, Manchester 12. The tube holding the powder sample is precision bored and the powder is consolidated by a mechanism on the front of the instrument. The performance of the sizer can be checked at any time by inserting the calibrator tube in place of the sample tube. The calibrator tube incorporates a synthetic ruby jewel orifice and provides standard air flow resistance against which the instrument can be checked and regulated to standard limits.

PRESSURE CONTROL DEVICES

A NEW range of control for use with pneumatic installations and with gauges such as the Firth Cleveland hydrostatic tank contents gauge to provide level alarm facilities is now available from Firth Cleveland Instruments Ltd. The range comprises single and double pressure switches, pressure relief valves and lamp annunciators.

Pressure switch type GS 300 is a single switch available in four models with pressure setting from 0.45-1.6 p.s.i. (1.0-3.7 ft. head of water) to 1.95-21.6 p.s.i. (4.5-50 ft. head of water). Types GS 310 and GS 320 are double switches being capable of individual adjustment. Like the single switches, they are capsule operated, with capsule ranges varying from 0.13-1.6 p.s.i. (0.3-3.7 ft. head of water) to 0.4-21.6 p.s.i. (1.0-50 ft. head of water).

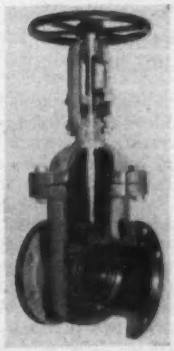
Where there is a risk of excessive pressure damaging a pressure capsule-operated indicator or similar device, it is suggested that a Firth Cleveland pressure relief valve type GS 330 should be mounted in parallel with the device.

The range of lamp annunciators manufactured makes provision for an audible signal device such as a bell, hooter or siren to be connected in parallel. Four different types of lamp annunciators are available, namely two-lamp and three-lamp, with and without muting facilities.

NEW REFLUX DIVIDER

LATEST addition to the range of "Spotton" reflux dividers is No. 1B-50/400 g.p.h. which in size comes between the established Models 1 and 2. In operating detail and design it follows the pattern of the other dividers. It is available for vacuum, pressure or atmospheric working with steam jacket or electrical heating. Remote control gear, mechanical, electric or air operated, can be fitted and the divider is suitable for flameproof areas. The sole manufacturers are **Metal Propellers Ltd.**, Purley Way, Croydon, Surrey, who have recently produced a new leaflet on the equipment.

WEDGE GATE VALVES



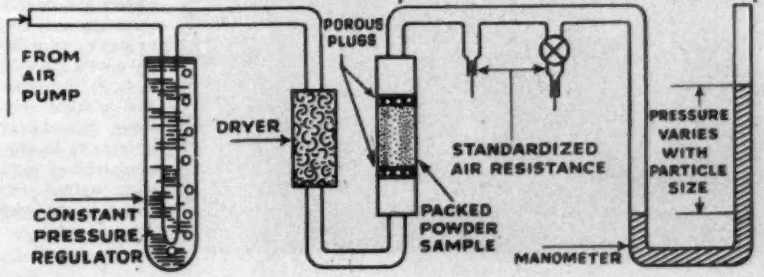
Cast steel wedge gate valves, from 2 to 16 in., with max. working temperature of 420°F are offered to standard or specified design by Triangle Valve Co. Ltd. of London and Wigan. Normal control is a direct handwheel and the design permits repacking under pressure when fully open. Wedge faces are fitted with renewable Teflon inserts but for certain uses other materials such as 'Viton A' and synthetic rubber may be fitted.

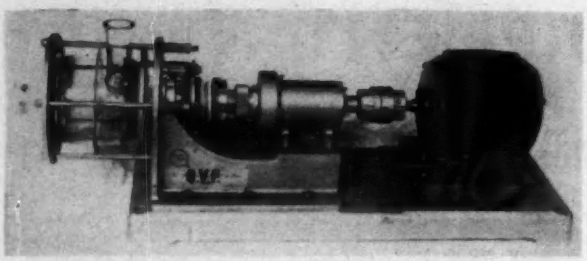
HIGH-RATE RIBBON-FILTER ELEMENTS

TECALEMIT are now producing new ribbon filter elements for high flow rate, efficient filtration of air, water, petrol, oil or other liquids where the particle to be removed is in the order of 40 microns and above. The element consists of a ribbon of resin-impregnated creped material helically wound edgewise on a rotating mandrel and electrically polymerised and fused to form a hollow, open-ended cylinder.

The corrugations of the ribbon form numerous passages between adjacent turns of the helix, through which the fluid can flow freely while the foreign matter

Working diagram of Fisher sub-sieve sizer





All-glass pump made by QVF Ltd.

is retained on the ribbon edges, inside or outside the cylinder according to the direction of flow.

The elements are easily cleaned for further use by washing in petrol or paraffin, or by blowing through with an air line. Elements will be available in sizes varying in outside diameter between ¾ in. to 6 in. and having a wall thickness varying from 3/32 in. to ¼ in.

PRECISION LABORATORY INCUBATOR Low temperature variation is one of the features of the new "Precision" incubator produced by **Laboratory and Electrical Engineering Co.**, Goldsmith Street, Nottingham. At 37°C it is claimed at less than 0.5°C throughout the entire cabinet and at 56°C less than 1°C.

Other developments are automatic interior lighting and a spring-loaded instrument panel which gives immediate access to the mains voltage setting and for the replacement of bulbs and striplights. The four shelves supplied comprise two perforated and two mesh, the latter allowing free air circulation for the reduction of drying time.

ALL-GLASS PUMPS FOR LIQUIDS Two all-glass pumps for dealing with corrosive liquids have been marketed by **Q.V.F. Ltd.**, of Fenton, Stoke-on-Trent. Model GPA/6 is powered by a 1 h.p. motor and GPA/9 has a 3 h.p. motor. In both cases the impeller is based on a vortex-type inlet with specially designed arms. The mechanical seal is a glass-loaded Fluon bellows rotating on a glass plate. Priming is necessary.

Performance figures for the GPA/6, when pumping cold water, give total head feet of 24 at 10 gallons a minute, 20 at 30 and 13 at 50. Figures for the GPA/9 and 45 at 20, 41 at 40, 35 at 60 and 25 at 100.

LIQUEFIED GASES PUMP

Production has started of two standard sizes of a larger model liquid gases pump by Distillers Company Ltd. One has a capacity of 100 gallons an hour at a pressure of 1,000 p.s.i. while the other is double that capacity. The refrigerating unit is supplied as a separate component fitted outside the pump casing. Price of a typical pump of 200 gall./hour capacity is about £1,650, complete with refrigerator

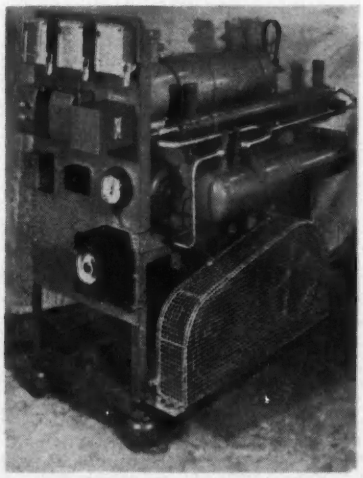
NEW BIRLEC REFRIGERATION DRYERS Details of an entirely new range of Birlec refrigeration dryers for compressed air applications are announced by **AEI-Birlec Ltd.**, Erdington, Birmingham 24. They are designed to meet the needs of users requiring compressed air at dewpoints down only to freezing point. Compared with adsorption drying, not only is there a saving in capital cost but operating expenses are considerably reduced, the company claim. In particular, power consumption is generally halved.

The refrigeration units are conventional in operation, and drying takes place by lowering the temperature to condense entrained water vapour. After separating out the condensate, the air is restored to room temperature. Dryers of ten capacities from ½ to 20 h.p. constitute the new range. The volume of compressed air dried covers a range from 100 c.f.m. to 5,000 c.f.m.

PNU-JET DUST FILTER COLLECTOR This dust filter and collector by **Nailsea Engineering Co. Ltd.**, Nailsea, Bristol, has multiple filter sleeves supported by cages, collecting the dust on the outside of the sleeves, and operates on the reverse flow system of cleaning. It is claimed that high efficiency is obtained by the use of 'Auto-Closing-Jets'.

The jets are coupled to a high pressure air supply by means of a solenoid valve. Air released by the valve depresses piston, plate and nozzle, closing off the outlet to normal flow. At the same time air passing through a precision nozzle at high velocity produces shock waves and some reverse flow. The total time for this jetting operation is 0.1 to 0.2 sec., thus restriction of normal flow is negligible. Each sleeve is subjected to this action every 60/80 sec., ensuring practically constant resistance.

LIQUID CHILLERS



Six standard liquid chillers of from 1½ to 20 b.h.p. are now being marketed by Carter Thermal Engineering Ltd., Bordesley Green, Birmingham 9. Designed principally for cooling water or ethylene glycol brine they can give a leaving temperature between −20°F and 65°F. Inner-fin condensors and evaporators are used in a system with fluorinated hydrocarbon refrigerants. The 5 h.p. model is illustrated

P.V.C. FILTER GRID

One of the largest units manufactured from unplasticised p.v.c. block material is this filter grid made by Plastic Filters Ltd. of Horsham, Sussex. Each frame measures approximately 5 ft. 6 in. square and weighs about 5 cwt. Manufacture is from 1½ in. thick unplasticised p.v.c. with welded construction throughout

Organic Peroxides for Polyester Resin Curing

EXPERIMENTS on the curing of several commercially available polyester resins, carried out in the laboratories of Novadel Ltd., St. Ann's Crescent, Wandsworth, London S.W.18, form the basis of a book just published by the company. Entitled "The role of organic peroxides in curing polyester resins and their influence on the physical properties of reinforced plastics," it has been written by J. W. Cywinski who presented a paper on the subject to the 1958 reinforced plastics technical conference of The British Plastics Federation.

The book is divided into three sections. The first deals with the theoretical aspects and is designed as an introduction to the problem, while the second considers some problems connected with curing methods. Observations on the influence of organic peroxides on the physical properties of reinforced plastics are contained in the third section.

Two New Polyester Surface Coating Resins

Two new Epok polyester surface coating resins, one wax free and the other wax containing, have been produced by British Resin Products Ltd., Devonshire House, Piccadilly, London W.1.

Epok A.3901 is a solution of a polyester resin in styrene and contains a small percentage of dissolved paraffin wax. When mixed with a peroxide catalyst and metal promoter, the resin will harden throughout and thin films in contact with air will be tack free in a few hours at room temperature. Epok A.3904 is a wax free air drying polyester resin. As with A.3901 the resin is mixed with a peroxide catalyst and metal promoter before use to give a lacquer. Curing can be accelerated with i.r. heating.

New Colvilles Process for Coloured Bricks

BUILDING bricks in a range of five colours—grey, red, brown, black and yellow—at a cost below that of kiln-fired clay facing bricks, has been started by Colvilles Ltd., the Scottish steelmakers. Colvilles have overcome a tendency for colours to bleach out under a previous process that used blast-furnace slag and hydrated lime.

The brick plant at Tollcross has been reorganised and a new and simpler process is now in hand. It uses a mixture of air-cooled blast-furnace slag, cement and water, with synthetic iron-oxide pigment added to all colours except grey. Extremely good compressive strength and weathering qualities are claimed. The colour permeates the whole brick and because of the high staining power it does not fade or bleach.

Will

Mr. H. W. G. Bidgood, a former joint managing director of I.C.I. Paints Division, who died on 6 February, left £26,037 net (duty paid £4,717).

Noral Symposium Discusses Use of Aluminium in Methane Transport

Members of the symposium listening to the opening address by Mr. E. D. Iliff of the Northern Aluminium Co. Ltd.

THE use of aluminium in the transport and handling of liquefied gases at sub-zero temperatures was discussed at a symposium organised by Northern Aluminimum Co. Ltd., at Aluminium Laboratories Ltd., Banbury, on 12-13 April. The main purpose of the symposium was to present for discussion the results of research and investigation carried out in this field by Aluminium Laboratories Ltd., the research organisation of the ALCAN group of companies, during the last two years

Three papers were presented. The first, "The mechanical properties at room temperature and at 196°C of some aluminium structural alloys", by R. J. Durham, head of mechanical testing section, Aluminium Laboratories Ltd., Banbury, discussed the mechanical properties of some aluminium alloys suitable for structural use at very low temperatures, with particular reference to NP 5/6 (Noral B54S) plate in thicknesses of up to 2 in.

The second paper, "The design of aluminium tanks for the sea transport of liquefied natural gas" was read by W. Ferguson, structural engineer, of Aluminium Laboratories Ltd., Geneva, and contained the results of investigations into the structural design of special inner tanks necessary in ships for the carriage of methane. Such tanks must be designed to resist considerable static and dynamic loading and must also satisfy certain exacting conditions as regards their arrangement and method of mounting within the hull.

These problems were fully discussed in the paper and details of several alternative types of tank were presented. The dimensions were selected with a ship of the 30,000-ton-tanker size in mind as offering the greatest design problem, but because the suggested approach to the design calculations was set out in detail, the method used can be applied to smaller tanks.

"Some aspects of the fabrication of vessels for the storage and transportation of liquefied gases, with particular reference to the welding of thick plate" was the title of the third paper, read by A. R. Woodward, head of the Jointing Division, Aluminium Laboratories Ltd., Banbury.

After discussing briefly the relative merits of the tungsten-inert gas (T.I.G.) and metal-inert gas (M.I.G.) processes for aluminium welding, this paper dealt with the use of conventional M.I.G. equipment for welding NP 5/6 plate in thicknesses of up to 2 in., and described development work on the use of high currents for the welding of thick plate with a minimum number of passes. The economic importance of establishing realistic standards was emphasised and the author suggested that one useful purpose of the paper might be to stimulate discussion on this subject.

In addition to the papers read, demonstrations and exhibitions were arranged as illustrations of the various subjects discussed.

A full report of the proceedings and discussion during the symposium will be published by Northern Aluminium Company in due course.

Johns-Manville Open Filter Aids Plant

CERTAIN grades of Celite filter aids are now being produced in the first wholly-owned U.K. plant of Johns-Manville Co. Ltd., at Hessle, near Hull. The new factory was officially opened on 22 April and will serve British and Continental markets.

The steel-framed building has portable arches of 100ft span, giving unobstructed floor space. The 28,000 sq. ft. is divided into five main sections, raw material storage, manufacturing, finished product storage, laboratory and offices.

Material conveyance is either mechanical or pneumatic and the manufacturing process and equipment is either quite similar to, or based almost entirely upon, the processes and equipment in traditional use for the production of Celite calcined diatomaceous earth filter aids.

Fuel and Power for the Chemical Industry

The U.K. chemical and allied industries used an average of 112,900 tons of coal a week in 1959 (118,700 tons/week in 1958) and 14,300 tons of oil (11,400 tons/week in 1958). Electricity generated for the industries in 1959 averaged 61.6 million kW hours (58.1 million kW hours/week in 1958 and a January 1960 weekly average of 70.9 million).

'Industry Should Foster Academic Work in Surface Chemistry'

THE suggestion that some people in industry might concern themselves with considering how to foster academic activity in the field of surface chemistry to the advantage of both sides, was made by Sir Harry Melville, K.C.B., F.R.S., secretary of the Department of Scientific and Industrial Research, at the annual dinner of the Surface Activity Group, Society of Chemical Industry, held in Kerswells Restaurant, Park Lane, London, on Monday. Earlier, Sir Harry had presented a paper at the group annual meeting on 'Ion exchange resins and their application'. Sir Eric Rideal, M.B.E., F.R.S., group chairman, presided at the dinner over an attendance of about 50 members and guests.

Since the retirement from their respective chairs of both Sir Eric and Professor N. K. Adam, who was also present, it seemed that the academic side had not kept pace with industrial development. That was a great pity, said Sir Harry, and he hoped that industry could help redress the balance.

Sir Harry, who was proposing the toast of the 'Surface Activity Group', said that in the early days Sir Eric Rideal, his old Professor of Colloid Science at Cambridge, more than most others had done, foresaw the big developments that would take place in this field of chemistry. There had been much development on the part of industry in surface activity—equally there was the quantitative development that had taken place, although, added Sir Harry, he was amused to see how empirical the approach still was in some quarters.

In reply, Sir Eric said that when at Birmingham Sir Harry had built up the best school in Europe for polymer chemistry and one of the best in the world. Many of the newer industries were founded on the principles of surface activity, a fact which should stimulate interest in the group. He paid particular tribute to the work of Mr. M. K. Schwitzer (Armour Hess Chemicals Ltd.), the group's hon. secretary.

Toast of 'Our guests' was proposed by Mr. R. C. Tarring (Shell Chemical Co.), hon. treasurer, who particularly welcomed Lt.-Col. F. J. Griffin, S.C.I. secretary, Professor Adam, who had presented the first paper at their inaugural meeting, Sir Harry Melville, and Sir Owen Wansbrough-Jones, K.B.E., C.B., a director of Albright and Wilson Ltd., formerly chief scientist at the Ministry of Supply and of the Cambridge Colloid Science Department.

Sir Owen, replying to the toast on behalf of the guests, referred to his new career in industry, following his life as a don and a civil servant. Surface activity was of particular importance to his company.

Cementation Work Ensures Development of Saskatchewan Potash Deposits

FUTURE development of important potash deposits in Saskatchewan has been assured following work by the Cementation Co. (Canada) Ltd., a member of the Cementation Group, 20 Albert Embankment, London S.E.11. It is estimated that some 4,000 million tons of high-quality potash lie beneath Saskatchewan Province at an average depth of 3,000 ft.

Shaft-sinking started at Patience Lake, 15 miles east of Saskatoon, in 1955 by the Potash Co. of America. To overcome water-bearing sands in the strata overlying the deposits and unstable ground generally, this company adopted a freezing process for the shaft-sinking. By this means a shaft was sunk to a depth of 3,500 ft. by the autumn of 1958 and mining operations subsequently began.

By November last, however, the incidence of water entering the shaft at about 35 g.p.m. was such that Cementation Co. (Canada) were asked to tackle the situation. Before they could begin work, the water inflow increased to 350 g.p.m., a rate much in excess of the mine's pumping capacity. Additional pumps were installed on an emergency basis. After three weeks of continuous work, Cementation succeeded in reducing the inflow to 25 g.p.m.

Potash Co. of America have engaged Cementation to carry out all phases of work relating to a programme of thawing out the ice wall surrounding the shaft lining and the treatment of the ground to provide an impermeable grout membrane as a substitute for the ice. This remedial work will take about 12 months to complete. Cementation, who have experienced difficult ground conditions elsewhere in Canada, are confident that the known difficulties can be overcome.

S.C.I. Chemical Engineering Group Has 722 Members

FORTY-FIRST annual meeting of the Chemical Engineering Group, Society of Chemical Industry, was held on 20 April at 14 Belgrave Square, London S.W.1, with Mr. E. W. Greensmith (I.C.I.) presiding. It was reported that membership at the end of 1959 totalled 722 and included 156 overseas members.

Mr. Greensmith was re-elected chairman. Other officers elected were: hon. treasurer, F. A. Greene; hon secretary, J. L. Sweeten (A.P.V. Co. Ltd.); hon. editor, Dr. J. L. Edgar (Shell Chemical); hon. recorder, C. J. Smith.

A special vote of thanks was accorded to Mr. P. M. Griffiths, chairman for several years of the papers and publications sub-committee and who has now retired.

Determining Nitrogen in Organic Compounds

A SPECTROPHOTOMETRIC method for the determination of ammonia by means of indanetrione has been described by S. Jacobs, National Institute for Medical Research, London N.W.7 (*The Analyst*, 1960, **85**, 257). The method has been used for the determination of nitrogen in serum, protein hydrolysates and heterocyclic compounds (e.g. nicotinic acid, 8-hydroxyquinoline and streptomycin) on the micro scale.

The reaction between indanetrione hydrate and ammonia was studied to determine the optimum conditions for developing the coloured condensation product of the reaction. The effects of cations on the reaction between ammonia and indanetrione hydrate and the inhibition of the reaction caused by the presence of selenium dioxide in the reaction mixture were studied.

The quantitative determination of nitrogen on an ultra-micro scale is possible by using suitable micro cells in the photometric procedure. Quantitative recoveries were obtained from 0.2 ml. samples of buffered solutions containing 0.5 μg. of nitrogen, as ammonia.

British Plastics' Year Book for 1960

British Plastics Year Book for 1960 is divided into nine sections. Three are devoted to classified lists of producers and suppliers of materials, products and equipment and a fourth contains a list of trade and proprietary names, with a definition of the products and the manufacturer concerned. There are also a 'Who's Who' section a glossary of technical terms, tables of properties of plastics, specifications relating to plastics, names and addresses of U.K. and overseas firms, as well as technical data. Publishers are Iliffe and Sons Ltd., Stamford Street, London S.E.1 (42s, by post 43s 9d).

Symposium on the Determination of Gases in Metals

Owing to the large number of registrations, the two-day symposium on the determination of gases in metals, organised by the Society for Analytical Chemistry in conjunction with the Iron and Steel Institute and the Institute of Metals (see C.A., 16 April, p. 652), will now be held at Denison House, 296 Vauxhall Bridge Road, London S.W.1, and not at Church House, Westminster, as originally proposed. First session of the symposium will start at 2.30 p.m. on 3 May.

I.C.I. May Extend Cyanide Plant at Cassel Works

Due to increasing demand for cyanide made at the Cassel Works of I.C.I., it seemed that output this year would have to be higher than ever, said Mr. W. C. Lyle, operations director of the General Chemicals Division. Sales were still rising and he thought the division would soon be extending the plant.

Overseas News

OUT-OF-COURT AGREEMENT MAY END LEGAL BATTLE OVER GENERAL ANILINE

AFTER years of legal dispute and fruitless negotiations, there now seems to be a chance of solving the long drawn-out battle between the Swiss holding company Interhandel and the U.S. authorities with regard to the confiscated chemical producer General Aniline and Film Corporation. This is at least to be assumed from statements made at the General Aniline annual meeting recently by the Department of Justice representative Colonel Townsend.

The case could stretch out over a further period of years, he said, and it would now be better to come to an out-of-court agreement with Interhandel than to continue to drag the case through the U.S. courts. A bad agreement of this kind, he even went so far as to say would be better than a good and promising lawsuit. Nevertheless, Colonel Townsend voiced his hope that Congress would pass a law enabling the Department of Justice to sell the General Aniline shares, after which the lawsuit could continue should the Swiss concern not be prepared to accept a private settlement; such a sale would be one to the highest bidder and not through negotiation channels. The return of the Corporation to Interhandel was out of the question.

The statements by the Department of Justice spokesman were followed, after the main meeting had come to an end, by one from the committee of American shareholders of General Aniline. This was to the effect that a meeting between this committee and Interhandel representatives had shown that the Swiss interests were very co-operative and desired a speedy agreement in the matter. The Swiss banking houses behind the Basle holding firm Interhandel were said to have requested their U.S. representative to meet with Colonel Townsend and a member of the American shareholders' committee to work for a quick solution to the problem. General Aniline, in whom Interhandel claim an interest, were confiscated as German property under the wartime Property of Enemy Aliens law.

U.S. Salt Water Process Uses Shrunken Membranes

Research workers at U.C.L.A., in the U.S. have developed a process using highly porous organic membranes for demineralisation of saline waters. A large number of membrane pores with small effective diameters are used and the pore structure is held in a plastics matrix capable of rejecting salt ions. The membranes are formed from cellulose acetate ultra filter material; pore size is controlled by adding a saturated aqueous solution of magnesium perchlorate and viscosity of the mixture reduced by mixing with acetone. The solution is cast on glass plates to form a film 0.004 in. thick. This is then immersed in water and stripped from the plate. Shrinking in hot water produces membranes that give a high degree of demineralisation at an appreciable production rate.

In the U.C.L.A. pilot unit, 12 circular membranes, about 4½ in. in diameter are assembled much like a plate and frame filter press. Saline water is circulated through the unit at 1,500 p.s.i. Demineralised water passes through the membranes into the collector discs and flows out at the bottom of the unit. This equipment produces 5 gall./sq. ft. of membrane per day of water containing 1,000 p.p.m. of dissolved solids, when the feed contains 3.5% sodium chloride, equivalent to the salt concentration in sea water. Work on this project is still in hand.

Hungarian Oxygen Plants for China and Argentina

The chemical plant design bureau Vegyterv, operated by the Hungarian State authorities, is at present assembling an oxygen plant in the Argentine and preparing for the delivery of an oxygen plant and a nitrogen production installation for Communist China. An adhesives factory is also being designed by Vegyterv for Yugoslavia.

Danish Factory in Siam

The Danish Dumex Co. have built a pharmaceutical factory in Bangkok to produce antibiotics and other pharmaceuticals under the terms of the new legislation on foreign investments in force in Thailand.

Dechema 1960 Meeting on Structural Materials

Annual meeting of Dechema (Deutsche Gesellschaft füf chemisches Apparatewesen e.V.) will take place from 14 to 16 June in the Palmengarten at Frankfurt a.M. It also represents the 26th meeting of the European Federation of Chemical Engineering and the 8th meeting of the European Federation of Corrosion.

A number of specialists will deliver lectures on the subject structural material problems in chemical technology and will report on experiences and progress which has been made in the use of materials for the construction of chemical plant. Programme of the meeting may be obtained from the Dechema, Frankfurt (Main), Postfach.

U.S. Work on Finding Uses for Depleted Uranium

Industrial applications for depleted uranium, available in the form of uranium hexafluoride, are being sought by scientists at the U.S.Bureau of Mines Reno Metallurgy Research Centre and the Atomic Energy Commission. One proposed use of this mildly radioactive material, as an air-pollution inhibitor, envisages a depleted-uranium catalyst that could be installed in vehicle exhaust systems to convert gases to harmless substances. Preliminary studies are said to indicate the technical feasibility of the idea.

Other uses that have been studied would employ derivatives of depleted uranium in high-strength steels, in bearing alloys, as a heavy medium for separating minerals from their ores, as a catalyst in processing oil from oil shale, in producing high-octane petrol, and to guard underground pipelines and other structures from corrosion.

200 Tonnes/Day Acid Plant for Dutch Firm

A plant with a production capacity of 200 tonnes of sulphuric acid a day is to be built by the Vlaardingen, Holland, firm of E.N.C.K. The acid will be produced by a contact process and imported sulphur. The existing factory, which processed pyrites into 100 tonnes of acid daily, is to be closed during 1960.

National Lead to Raise Titanium Oxide Output in Europe

The National Lead Co., of the U.S., are planning to expand production in Europe of titanium oxide pigments. National Lead have manufacturing subsidiaries in Holland and Belgium, and it is at these plants where capacities are to be raised.

Sterling Drug to Erect More Overseas Plant

The U.S. concern Sterling Drug Co., which last year realised a group turnover of $209 million ($198 million) is in the current year to erect production plants in Costa Rica and Nicaragua and to extend its installation in the Philippines. Last year alone the company started subsidiaries in Holland, Sweden, Switzerland, Australia and Canada.

Uruguay Seek Tenders for Sulphur Extraction Unit

The Administración Nacional de Combustibles, Alcohol y Portland, Uruguay, has issued a tender for a sulphur extraction plant. A guarantee deposit of 15,000 pesos is required, and the closing date is 10 May.

Brazilian Firm Speeds Refinery Expansion

Petroleo Brasileiro S.A. report that work on the Duque de Caxias refinery speeded up in 1959 and preparatory work for expansion of the President Bernardes and Gandulpho Alves refineries in Brazil have been carried out. Construction of the synthetic rubber plant near the Duque de Caxias refinery has also started. The plant will have a capacity of 40,000 tons a year.

Ion Exchange Resins Resist Oxidative Degradation

A range of robust ion exchange resins said to resist oxidative attack and physical breakdown has been introduced by Rohm and Haas, Philadelphia.

Amberlite 200 is, like conventional resins, a sulphonated styrene-divinylbenzene copolymer, but unusual chemical and physical stability has been built into the polymeric structure. Some ion exchange capacity and regeneration efficiency has been sacrificed to achieve oxidative and attrition resistance.

Amberlite 200 resists the oxidative degradation that shortens the useful life of standard resins by causing the moisture content to rise sharply. The company claims that standard resin beads break down six to 15 times quicker than Amberlite 200 and that premium resins break down two to four times quicker.

Price of Freon-C318 Propellant Cut by Du Pont

To coincide with the start-up of their new semi-commercial scale plant for making the propellant octafluorcyclobutane, E. I. du Pont de Nemours have cut the price of Freon-C318 from $20 to $5 per lb. in 165-lb. cylinders. In addition to use in combination with nitrous oxide in aerosol whipped creams, Freon-C318 is expected to be the first fluorocarbon propellant used in foods if, as anticipated, the Food and Drug Administration approves its use in foodstuffs later this year.

New Vinyl Elastomers Developed by Monsanto

Properties not found in any commercial rubber are claimed for a series of vinyl elastomers developed by Monsanto Chemical Co., U.S., and now in the pilot plant stage. Compositions have not been given, but the base polymer is known as DX-954. There are two modifications—DX-954-GP for general purposes and DX-954-S for resistance to oil and solvents.

Features claimed include: durability at temperatures of 400°F; very low compression set up to ozone cracking; weatherability and immunity to ozone cracking; short cycle, high-temperature cure. The new products can be cured with typical peroxide curing agents such as dicumyl peroxide or di-*tert*-butyl peroxide. Carbon black can be used as a reinforcing agent and zinc oxide as a filler. Antioxidant requirements are said to be small. High chemical stability of these elastomers is thought to come from vulcanisation through a carbon-to-carbon cross-linkage.

Danish Firm's Fourfold Rise in Liquid Anhydrous Ammonia Sales

The Danish Sulphuric Acid and Superphosphate Works estimate that sales of their potash-superphosphate compound, introduced in 1954, totalled 400,000 tons last year. Sales of liquid anhydrous ammonia on an experimental basis rose from 300 tons in 1957 to 600 tons in 1958 and in the first half of 1959 was four times the 1958 rate. Their new phosphoric acid plant has a daily capacity of 50 tons.

The company is planning, in conjunction with Norsk Hydro and a fertiliser sales co-operative, to construct an ammonia plant at Kalundborg, where sulphuric acid and superphosphate plants are in operation. Possibility of utilising petroleum by-products has been discussed following a decision to build a refinery in the area.

Dow on Stream with Two New Polythene Plants

Production of polythene has been started by Dow Chemical, Midland, Mich., at two new plants—at Findlay, Ohio, and Fresno, Calif. The company expects the total market for polythene film to reach 650 million lb. a year by 1965, more than double the 1959 figure.

Hercules Powder Subsidiary for Sweden

Hercules Kemiska Aktiebolog, a new subsidiary of Hercules Powder, is to be established in Sweden to erect and operate a plant for the production of chemicals for the paper and pulp industry. Initially, production will centre on rosin size.

High-grade Thorium Hydrate Produced in U.S.

High-grade thorium hydrate has been produced from the thorite reserve of Sawyer Petroleum on the Montana-Idaho border. A new and simpler process is being used by Techmanix Corporation to produce better than 90% pure hydrate for Sawyer Petroleum. The Techmanix plant is pilot scale and it is hoped with the use of domestic ores that it can be scaled up to full size to compete commercially in the world markets. At present most high purity thorium products in the U.S. originate from imported monazite sand.

Ethyl Corporation to Make Tetramethyl Lead

The Ethyl Corporation are now taking steps to install facilities at their Baton Rouge, La., site to make tetramethyl-lead anti-knock additive "when needed by the oil industry". Also produced on the site are tetraethyl lead, trimethyl phosphate and expanded vinyl chloride. E.I. du Pont de Nemours state that their TML unit now under construction at Deepwater Point, N.J., will be on stream late this year.

Italian Chemicals to India

What is described as a well-known Milanese chemical concern is reported to have received an order from India for chemicals worth a total of 15,300 million lire.

Spanish Investments Boost Fertiliser Capacity

Of a total of 27,567 million pesetas to be invested in Spanish industry by inland interests in the current year, some 1,641 million pesetas are destined for the country's synthetic fertiliser industry and 1,160 million pesetas for the privately-owned section of the chemical industry. The Spanish fertiliser industry is to expand its capacities to supply 50% of home demand by 1962. At the moment output covers 27%.

New Dow Chemical Offices In Italy and West Germany

Dow Chimica Italiana S.p.A., a newly-formed Italian subsidiary of Dow Chemical, Midland, Mich, U.S., have opened a marketing office at Via Larga 31, Milan, Italy. It will handle the marketing of Dow products in Italy, Greece and the Near East. Dow are to build a polystyrene plant in the Leghorn area.

Opening of a marketing office at Weissfrauenstrasse 3, is announced by Deutsche Dow Chemie GmbH. The new office will handle the marketing of Dow chemicals, plastics and agricultural products in Germany, Austria and Switzerland.

First True Fluorocarbon Elastomers Claimed by Minnesota Mining, U.S.

SYNTHESIS of what is called the first true fluorocarbon elastomer—a copolymer of trifluoronitrosomethane and tetrafluoroethylene — is claimed by chemists of Minnesota Mining and Manufacturing, U.S. The material is fully fluorinated and is said to be elastomeric and serviceable down to −50°C, or lower. For this combination of properties, there must be regularly recurring nitrogen-oxygen linkages in the polymer chair. The N-O linkages and the hydrogen-free structure combine to give the chain low 'stiffness' and low interaction energies between adjacent chains, resulting in the low temperature serviceability.

The product is now being made in small quantities for further evaluation, early tests having shown promise for use as a textile treating agent in addition to potential use as an elastomer.

The copolymer can be made either by combining the two liquid monomers at 0°C, or lower—or by emulsion, suspension and solution polymerisation. The product is recovered by extracting it from the reaction mixture with Freon 113. Nuclear magnetic resonance is said to confirm $-NO-CF_2-\underset{\displaystyle CF_3}{\underset{|}{CF}}-$ structure along the chain.

The polymer cures spontaneously with diamines at room temperature as well as at 250°F— moulding temperature. The research team has found that trifluoronitrosomethane does not polymerise with itself, but that this interesting material will copolymerise with many ethylenically unsaturated compounds. C_3F_7NO, C_2F_5NO, and $C_8F_{17}NO$, for example, all react to give interesting polymers. These products have not been evaluated and it is not yet known whether they are of potential interest to industry.

PEOPLE in the news

● **Mr. F. A. S. Wood** has been elected chairman of the Croda Organisation Ltd., Cowick Hall, Snaith, Goole, Yorks, to succeed the late Sir Edward Crowe, K.C.M.G. Mr. Wood retains his post as managing director. **Mr. Norman Townend, F.C.A.,** has also joined the board.

● **Mr. W. E. K. Piercy,** a director of Albright and Wilson Ltd., will take the chair at one of the sessions of a three-day course to be held by the Federal Trust for Education and Research at St. Ermin's Hotel, London S.W.1, on 4, 5 and 6 May. The session will discuss the effect of the Common Market and the E.F.T.A. on the demand for raw materials and food produced by the Commonwealth.

● **Mr. J. Howlett, B.Sc., F.R.I.C., A.M.I. Chem.E.,** general manager, Hull site, Distillers Co., has been appointed a division director of the D.C.L. Chemical Division. He has been with D.C.L. for 36 years,

J. Howlett

beginning with analytical work at the Research Station then located at Hammersmith. He was transferred to Epsom on the establishment there of the Research and Development Department in 1927. His association with the Hull factory began in 1929 when the plant constructed at Salt End by British Industrial Solvents started operation. He went to Salt End as section chemist and was later process superintendent and in charge of pilot plant. In 1941 he was transferred to the pilot plant at Tonbridge of which he was appointed manager in 1945. In 1954 he returned to Hull as works manager. Mr. Howlett is a member of the University Appointments Board and the Committee on Industrial Fires and Explosions under the Ministry of Labour.

● **Mr. P. R. Henderson,** of the I.C.I. Wilton Works civil and architectural section of the engineering department, is to assist Danish engineers in the design and construction of the new polythene plant of Danbritkem A/S, in which I.C.I. have an interest. Mr. Henderson, who leaves during May, expects to be in Denmark for about 18 months.

● **Mr. Wilfred P. Fletcher,** formerly manager of the Elastomers Research Laboratory at Hemel Hempstead, has been appointed assistant elastomers sales manager for the Du Pont Co. (United Kingdom) Ltd., 76 Jermyn Street, London S.W.1. Other organisation changes within the elastomer chemicals department are the appointment of **Dr. James B. Coulter,** formerly technical sales representative in the Manchester area, as manager of the Elastomers Research Laboratory, and the appointment of **Dr. Jack J. Mausner,** formerly at the Hemel Hempstead Laboratory, as technical sales representative in the Manchester area. These moves are in line with the company's overall policy of placing an ever-increasing amount of responsibility in the hands of British personnel.

● **Prince Philip** will be guest of honour at the jubilee dinner of the Textile Institute at the Dorchester Hotel, London, on 2 June. The diploma of Honorary Fellowship of the Institute will be handed to him by the president, the Earl of Derby.

Mr. P. D. O'Brien, chairman of Laporte Industries Ltd., unveiling the plaque to commemorate the official opening of the new Laporte Titanium Ltd. research laboratory at Stallingborough on 13 April

● **Mr. M. A. L. Banks** is to be appointed a director of the British Petroleum Co. Ltd. to fill the vacancy caused by the retirement of **Sir Neville Gass,** former chairman, on 1 July. As already announced **Mr. M. R. Bridgeman** will become chairman.

● **Sir Cyril Hinshelwood,** president of the Royal Society, has been awarded the Order of Merit by the Queen. Knighted in 1948, Sir Cyril was joint winner of the Nobel Prize for Chemistry in 1956. Aged 62 he has been Dr. Lee's Professor of Chemistry, Oxford University, since 1937. Sir Cyril is known for his experimental work on the mechanism of chemical reactions, on chemical thermodynamics and on bacteriology. A Fellow of the Royal Society since 1929, he has been president since 1955. From 1953 to 1956 he was a member of the Advisory Council on Scientific Policy.

● **Mr. N. E. Langdale,** I.C.I. education officer, has been seconded under the Colombo Plan to assure the directorship of practical training and placement at the Delhi College of Engineering and Technology for two years.

● **Dr. A. G. Peto,** whose temporary address is now 23 Avenue Road, London N.W.8, has been appointed organic research chemist for Proprietary Perfumes Ltd. Previously he worked in Unilever's Port Sunlight research department.

● **Mr. G. F. Ashford, O.B.E.,** who was appointed to the board of the Distillers Company Ltd. in 1958, at the age of 47, and who recently assumed the position of deputy chairman of the Chemical Group, has had a long and close connection with the company. Acting on its behalf, he was intimately concerned with the early negotiations with British Petroleum, which led to the formation of British Hydrocarbon Chemicals Ltd., in 1947. Today he is one of the four D.C.L. directors on the board of B.H.C. It was in 1937 that Mr. Ashford joined D.C.L., having previously taken honours degrees in both Natural Science and Law, and having practised as a solicitor. He thus entered the business with an exceptionally wide educational and professional background, which has proved of great benefit.

G. F. Ashford

G. F. Prescott

● **Mr. G. F. Prescott,** works manager of the Distillers Plastics Group factories, Barry, Glamorgan, has been appointed a director of British Resin Products Ltd.

● **Dr. Richard O. Roblin** has been elected as president and director of the Cyanamid European Research Institute in Geneva. Co-discoverer of sulphadiazine and sulphamerazine and vice-president for research and development of American Cyanamid, he takes over from **Dr. R. C. Swain,** who was recently appointed director general of Cyanamid International. Dr. Swain will continue as a director of the basic research institute. **Dr. Mario Scalera,** assistant to the general manager of Cyanamid's Central Research Division, has been elected as a vice-

(*Continued in p.* 728)

Commercial News

- **Higher Demand Sustained, say A.C.C.**
- **Burt Boulton Finance Chemical Plans**
- **Manchester Oil Profits More than Doubled**
- **Petrochemical Growth for B.P. and Shell**

Associated Chemical

Some of the higher demand experienced by Associated Chemical Companies Ltd. during 1959 might have been due to customers' building up stocks that had run-down in 1958, but so far, the higher level had been sustained in the current year, stated Mr. M. J. C. Hutton-Wilson, chairman in his annual report.

None of the group prices had risen since 1957 and most of them had remained stable for much longer; over the past three years there had in some cases been substantial reductions. Rises in wages and other costs had been absorbed by higher outputs and efficiencies.

Mr. Hutton-Wilson said that considerable progress was made in 1959 with the schemes for modernising the chromium chemical plants. Different sections of the new plants were expected to be brought into the production stream progressively later this year. The new contact sulphuric acid plant which came into production in May had proved entirely satisfactory.

The Brotherton Co. plants operated at a high rate of capacity and had met all demands.

While much had been accomplished since the merger a great deal remained to be done if they were to continue as a developing undertaking. It had recently been decided to link the names of the subsidiary companies to that of the parent company and to that end Brotherton and Co. Ltd. had been renamed A.C.C. (Brotherton) Ltd., and British Chrome and Chemicals Ltd. had become A.C.C. (Chrome and Chemicals Ltd.). Agricultural interests had been grouped under A.C.C. (Fertilisers) Ltd. with Mr. A. Henderson as chairman; individual companies in this division will continue to operate under their own names.

Trading activities are based on the separate subsidiary companies and the parent company provides central divisions for research and technical services, purchasing, personnel and general administration and financial control. The parent board also deals with overall policy and management matters, including group developments.

Group trading profit for 1959 was £1,266,675 (£1,156,536). Tax took £355,166 (£425,060) and net profit was £520,871 (£481,430). The 1% increase in final dividend on ordinary gave a total for the year of 15% (14%).

British Petroleum

B.P. Group's petrochemical operations in 1959 were again appreciably higher in size and scope, said Sir Neville Gass at the annual meeting. The three Grangemouth companies operated satisfactorily. When the third ethylene unit of British Hydrocarbon Chemicals came on stream in mid-1960, combined feedstock needs of the three cracking units would be nearly 1 million tons a year.

For Naphtachimie S.A., an associated company, chemical production and sales were a record. New plants for propylene oxide and propylene glycols were successfully commissioned and it is expected that a new cracker and a second ethylene oxide plant will be commissioned in mid-1960.

In Germany, Erdölchemie GmbH, in whom B.P. have a 50% interest through their German associate, had completed the first stage of their construction. This included plants for the manufacture of ethylene oxide, ethylene glycols and propylene oxide. Construction of second stage plants, which would about treble capacity for ethylene and ethylene derivatives, was almost completed during 1959.

B.D.H. Ireland

A new company to be known as B.D.H. (Ireland) Ltd., has been formed to manufacture and distribute B.D.H. products in the Republic of Ireland. The company is expected to start trading by the end of this year. Mr. W. P. Mullen, who has represented B.D.H. in Eire since 1943, has been appointed director and general manager.

Burt Boulton and Haywood

Burt Boulton and Haywood are to raise about £275,000 by a rights issue to Ordinary holders. Part of the money is required in connection with an expansion of the business of the Belgian subsidiary, Soc. Chimique de Selzaete, as a result of that company's success in obtaining extra supplies of tar and benzole. The major part of the remaining money will be used in connection with the expansion of the company's chemical business in the U.K.

Danbritkem A/S

The new joint company between I.C.I. and the owners of the Maersk refinery, A/S Dampskibsselskabet Svendborg and Damskilbsselskabet af 1912 A/S has now been formed under the title Danbritkem A/S. It will manufacture polyolefins—initially polythene—adjacent to the Maersk refinery, Copenhagen. Capital is about £4 million. Directors are: M.McK. Moller, chairman, Dr. A. W. Taylor, A. Renfrew, H. H. Koch and H. Nielsen.

Manchester Oil Refinery

Group trading profits of Manchester Oil Refinery (Holdings) Ltd. for 1959 were £480,000 (£223,000). Sum attributable to the company before tax of £87,500 was £237,000, compared with a loss of £32,000. Damages of £38,000 payable to a former managing director for breach of service agreement in a previous year were charged in 1959. A final dividend of 10%, making 15% is proposed. No payment was made in 1958 and the 1957 total was 12½%.

That the excellent results made little impact on share prices, is believed in the City to be due to speculation as to the company's large investment in Albatros S.A. Belge pour le Raffinage de Petrole, an Antwerp refinery. This associate has not paid any dividends on ordinary for some years past. The agreement under which British Petroleum supply crude oil to Albatros for processing is due to end later this year and is unlikely to be renewed.

Permutit Co.

The Permutit Co. Ltd. announce a final dividend of 12½%, making 20% (15%). Net profit, after tax, was £187,190 (£168,968).

Q.V.F. Ltd.

Q.V.F. Ltd. are busier than ever before, according to Mr. Brian H. Turpin, managing director. Sales in the U.K. have this year amounted to 65% more than for the same period of 1959, while export sales have risen 40%. There was every indication that 1960 would be a record sales year.

'Shell' Transport

Capital spending on chemical plants by group companies totalled £26 million in 1959 (£22 million in 1958), making a 1955-59 total of £108 million, stated Lord Godber, chairman, at the annual meeting of 'Shell' Transport and Trading.

The rapidly growing demand for chemicals based on petroleum was attracting newcomers, both oil and chemical companies, to the industry and competition might therefore be expected to become more severe.

Chemicals account for about 5% of total group profit and represent 9% of group sales. Group net income increased to £175.5 million (£158.8 million). Sales and operating income for the Royal Dutch/Shell Group was £175.5 million (£158.8 million).

Tharsis Sulphur

Net profit for 1959 of Tharsis sulphur and copper was £155,887 (£122,728), after tax of £73,238 (£73,657) and depreciation of £125,621 (£92,577). A dividend of 12½% (same) has been declared.

INCREASES OF CAPITAL

ANGLO CHEMICAL AND ORE CO. LTD., Palmerston House, Bishopsgate, London E.C.2. Increased by £100,000, beyond the registered capital of £200,000.

ARMOUR HESS CHEMICALS LTD., oil distillers, 7-11 The Butts, Rochdale. Increased by £325,000 beyond the registered capital of £325,000.

NEW COMPANIES

KINGSLEY AND KEITH (CHEMICALS) LTD. Cap. £1,000. Manufacturers of and dealers in chemicals, etc. Subscribers: A. N. Emanuel, 69 Gloucester Place, London W.1, and J. Franks.

BRITISH CHEMICAL PRICES

GENERAL CHEMICALS

Acetic Acid. D/d in ret. barrels (tech. acid barrels free); in glass carboys, £8; demijohns, £12 extra. 80% tech., 10 tons, £97; 80% pure, 10 tons, £103; commercial glacial, 10 tons, £106.

Acetic Anhydride. Ton lots d/d, £128.

Alum. Ground, f.o.r., about £25.
MANCHESTER: Ground, £25.

Aluminium Sulphate. Ex-works, d/d, £15 10s to £18.
MANCHESTER: £16 to £18.

Ammonia, Anhydrous. Per lb., 1s 9d-2s 3d.

Ammonium Chloride. Per ton lot, in non-ret. pack, £33 2s 6d.

Ammonium Nitrate. D/d, 4-ton lots, £37 10s.

Ammonium Persulphate. Per cwt., in 1-cwt. lots, d/d, £6 13s 6d; per ton, in min. 1-ton lots, d/d, £123 10s.

Ammonium Phosphate. Mono-and di-, ton lots, d/d, £106 and £97 10s.

Antimony Sulphide. Per lb., d/d UK in min. 1-ton lots; crimson, 5s d/d to 5s 5½d; golden, 3s 3½d d/d per lb. to 4s 8½d d/d.

Arsenic. Ex-store, £45 to £50.

Barium Carbonate. Precip., d/d, 5-ton lots or more, bag packing, £41 per ton.

Barium Chloride. 2-ton lots, £45.

Barium Sulphate [Dry Blanc Fixe]. Precip. 2-ton lots, d/d, £39.

Bleaching Powder. Ret. casks, c.p. station, in 4-ton lots. £30 7s 6d.

Borax. Ton lots, in hessian sacks, c.p. Tech. anhydrous, £70; gran., £47; crystal, £50 10s; powder, £51 10s; extra fine powder, £52 10s; BP, gran., £56; crystal, £59 10s; powder, £60 10s; extra fine powder, £61 10s. Most grades in 6-ply paper bags, £1 less.

Boric Acid. Ton lots, in hessian sacks, c.p. Comm., gran., £78; crystal, £87; powder, £84 10s; extra fine powder, £86 10s; BP gran., £91; crystal, £99; powder, £96 10s; extra fine powder, £98 10s. Most grades in 6-ply paper bags, £1 less.

Calcium Chloride. Ton lots, in non-ret. pack; solid and flake, about £15.

Chlorine, Liquid. In ret. 16-17 cwt. drums d/d in 3-drum lots, £41.

Chromic Acid. Less 2½%, d/d UK, in 1-ton lots, per lb., 2s 2¾d.

Chromium Sulphate, Basic. Crystals, d/d, per lb., 8½d; per ton, £79 6s 8d.

Citric Acid. In kegs, 1-4 cwt. lots, per cwt., £11; 5-19 cwt. lots, per cwt., £10 16s; 1 ton lots, per cwt, £10 15s; packed in paper bags, 1-4 cwt. lots, per cwt., £10 12s; 5-19 cwt. lots, per cwt., £10 8s; 1 ton lots, per cwt., £10 7s.

Cobalt Oxide. Black, per lb., d/d, bulk quantities, 13s 2d.

Copper Carbonate. Per lb., 2s 1d.

Copper Sulphate. £85 per ton less 2% f.o.b. Liverpool.

Cream of Tartar. 100%, per cwt., about £11 12s.

Formaldehyde. In casks, d/d, £40.

Formic Acid. 85%, in 4-ton lots, c.p., £91.

Glycerine. Chem. pure, double distilled 1.2627 s.g., per cwt., in 5-cwt. drums for annual purchases of over 5-ton lots and under 25 tons, £12 1s 6d. Refined technical grade industrial, 5s per cwt. less than chem. pure.

Hydrochloric Acid. Spot, per carboy, d/d (according to purity, strength and locality), about 12s.

Hydrofluoric Acid. 60%, per lb., about 1s 2d.

Hydrogen Peroxide. Carboys extra and ret. 27.5% wt., £119 0s 0d; 35% wt., d/d, £143.

Iodine. Resublimed BP, under 1 cwt., per lb., 11s; for 1-cwt. lots, per lb., 10s 6d.

These prices are checked with the manufacturers, but in many cases there are variations according to quality, quantity, place of delivery, etc. Abbreviations: d/d, delivered; c.p., carriage paid; ret., returnable; non-ret. pack., non-returnable packaging; tech., technical; comm., commercial; gran., granular.

All prices per ton unless otherwise stated

Iodoform. Under 1 cwt., per lb., £1 2s 4d for 1-cwt. lots, per lb., £1 1s 8d, 5 cwt., per lb., 21s 1d, crystals, 3s more.

Lactic Acid. C.P., 44% by wt., per lb., 14d; 50% by wt., 15¾d; 80% by wt., 25½d; dark tech., 44% by wt., per lb., 9d; 1-ton lots, ex-works, usual container terms.

Lead Acetate. White, about £154.

Lead Nitrate. 1-ton lots, about £135.

Lead, Red. Basic prices: 15-cwt. drum lots, Genuine dry red, £110 15s per ton; orange lead, £122 15s per ton; Ground in oil: red, £131, orange, £143.

Lead, White, Basic prices: in 5-cwt. drums, per ton for 2 ton lots, Dry English £122; Ground in oil, £141.

Lime Acetate. Brown, ton lots, d/d, £40; grey, 80-82%, ton lots, d/d, £45.

Litharge. In 5-cwt. drum lots, £122 15s per ton.

Magnesite. Calcined, in bags, ex-works, about £21.

Magnesium Carbonate. Light, comm., d/d, 2-ton lots, £84 10s under 2 tons, £97.

Magnesium Chloride. Solid (ex-wharf), £17 10s.

Magnesium Oxide. Light, comm., d/d, under 1-ton lots, £245.

Magnesium Sulphate. Crystals, £16.

Mercuric Chloride. Tech. powder, per lb., for 1-ton lots, £1 1s; 5-cwt. lots, in 28-lb. parcels, £1 1s 3d; 1-cwt. lots, £1 1s 6d.

Mercury Sulphide, Red. 5-cwt. lots in 28-lb. parcels, per lb., £1 10s 6d; 1-cwt. lots, £1 11s.

Nickel Sulphate. D/d, buyers UK, nominal, £170.

Nitric Acid. 80° Tw., £35 2s.

Oxalic Acid. Home manufacture, min. 4-ton lots, in 56 lb. paper bags, c.p., about £130.

Phosphoric Acid. Tech. (s.g. 1.700) ton lots, c.p., £100; BP (s.g. 1.750), ton lots, c.p., per lb., 1s 4d.

Potash, Caustic. Solid, 1-ton lots, £95 10s; liquid, £36 15s.

Potassium Carbonate. Calcined, 96/98%, 1-ton lots, ex-store, about £76.

Potassium Chloride. Industrial, 96%, 1-ton lots, about £24.

Potassium Dichromate. Gran., per lb., in 5-cwt. to 1-ton lots, d/d UK, 1s 2¼d.

Potassium Iodide. BP, under 1-cwt., per lb., 7s 2d; per lb. for 1-cwt. lots, 6s 11d.

Potassium Nitrate. 4-ton lots, in non-ret. pack, c.p., £63 10s.

Potassium Permanganate. BP, 1-cwt. lots, per lb., 1s 11¾d; 3-cwt. lots, per lb., 1s 11½d; 5-cwt. lots, per lb., 1s 10¾d; 1-ton lots, per lb., 1s 10½d; 5-ton lots, per lb., 1s 10d. Tech., 1-ton lots in 1-cwt. drums, per cwt., £9 18s; 5-cwt. in 1-cwt. drums, per cwt., £10; 1-cwt. lots, £10 9s.

Salammoniac. Ton lot, in non-ret. pack, £47 10s.

Salicylic Acid. MANCHESTER: Tech., d/d, per lb., 2s 6d, cwt. lots.

Soda Ash. 58% ex-depot or d/d, London station, 1-ton lots, about £16 11s 6d.

Sodium Acetate. Comm. crystals, d/d, £75 8s.

Soda, Caustic. Solid 76/77%; spot, d/d 1-ton lots, £33 16s 6d.

Sodium Bicarbonate. Ton lot, in non-ret. pack, £12 10s.

Sodium Bisulphite. Powder, 60/62%, d/d 2-ton lots for home trade, £46 2s 6d.

Sodium Carbonate Monohydrate. Ton lot, in non-ret. pack, c.p., £64.

Sodium Chlorate. 1-cwt. drums, c.p. station, in 4-ton lots, about £75 per ton.

Sodium Cyanide. 96/98%, ton lot in 1-cwt. drums, £126.

Sodium Dichromate. Gran. Crystals per lb., 1s. Net d/d UK, anhydrous, per lb., 1s 1¾d. Net del. d/d UK, 5-cwt. to 1-ton lots.

Sodium Fluoride. D/d, 1-ton lots and over, per cwt., £5; 1-cwt. lots, per cwt., £5 10s.

Sodium Hyposulphite. Pea crystals, £38; comm., 1-ton lots, c.p., £34 15s.

Sodium Iodide. BP, under 56 lb. per lb., 10s; 56 lb. and over, 9s 9d.

Sodium Metaphosphate [Calgon]. Flaked, paper sacks, £133.

Sodium Metasilicate. (Spot prices) D/d UK in 1-ton lots, 1-cwt. free paper bags, £29.

Sodium Nitrate. Chilean refined gran. over 98%, 6-ton lots, d/d c.p., per ton, £29.

Sodium Nitrite. 4-ton lots, £32.

Sodium Perborate. (10% available oxygen) in 1-cwt. free kegs, 1-ton lots, £129 10s; in 1-cwt. lots, £139 5s.

Sodium Percarbonate. 12½% available oxygen, in 1-cwt. kegs, £170 15s.

Sodium Phosphate. D/d, ton lots: di-sodium, crystalline, £40 10s, anhydrous, £88; tri-sodium, crystalline, £39 10s, anhydrous, £86.

Sodium Silicate. (Spot prices) 75-84° Tw. Lancs and Ches., 6-ton lots, d/d station in loaned drums, £12 10s; Dorset, Somerset and Devon, per ton extra, £3 5s; Scotland and S. Wales, extra, £2 17s 6d. Elsewhere in England, not Cornwall, extra, £1.

Sodium Sulphate [Desiccated Glauber's Salt]. D/d in bags, about £19.

Sodium Sulphate [Glauber's Salt]. D/d, up to £14.

Sodium Sulphate [Salt Cake]. Unground, d/d station in bulk, £10.
MANCHESTER: d/d station, £10 10s.

Sodium Sulphide. Solid, 60/62%, spot, d/d, in drums in 1-ton lots, £36 2s 6d; broken, d/d, in drums in 1-ton lots, £37 2s 6d.

Sodium Sulphite. Anhydrous, £71 10s; comm., d/d station in bags, £27-£28 10s.

Sulphur. 4 tons or more, ground, according to fineness, £20-£22.

Sulphuric Acid. Net, naked at works, 168° Tw. according to quality, £9 15s. per ton. £11 7s 6d; 140° Tw., arsenic free, £8 2s 6d; 140° Tw., arsenious, £7 17s 6d.

Tartaric Acid. Per cwt.: 10 cwt. or more, in kegs, 300s; in bags, 292s per cwt.

Titanium Oxide. Standard grade comm., rutile structure, £178; standard grade comm., anatase structure, £163.

Zinc Oxide. Per ton: white seal, £110; green seal, £108; red seal, £105.

SOLVENTS AND PLASTICISERS

Acetone. All d/d. In 5-gal. drums, £128; in 10-gal. drums, £118; in 40-45 gal. drums, under 1 ton, £93; 1-5 tons, £90; 5-10 tons, £89; 10 tons and up, £88; in 400-gal. tank wagons, £85.

Butyl Acetate BSS. 10-ton lots, £165.

***n*-Butyl Alcohol BSS.** 10 tons, in drums, d/d, £137 10s.

***sec*-Butyl Alcohol.** All d/d. In 5-gal. drums, £168; in 10-gal. drums, £158; in 40-45 gal. drums, under 1 ton, £133; 1-5 tons

£130; 5-10 tons, £129; 10 tons and up, £128; in 400-gal. tank wagons, £125.

tert-**Butyl Alcohol.** 5-gal. drums, £195 10s; 40/45-gal. drums: 1 ton, £175 10s; 1-5 tons, £174 10s; 5-10 tons, £173 10s; 10 tons and up, £172 10s.

Diacetone Alcohol. Small lots: 5-gal. drums, £185; 10-gal. drums, £175. 40/45-gal. drums: under 1 ton, £148; 1-5 tons, £147; 5-10 tons, £146; 10 tons and over, £145, in 400-gal. tank wagons, £142.

Dibutyl Phthalate. In drums, 10 tons, d/d per ton, £203; 45-gal. 1-4 drums, £209.

Diethyl Phthalate. In drums, 10 tons, per ton, £187 10s; 45-gal. 1-4 drums, £193 10s.

Dimethyl Phthalate. In drums, 10 tons, per ton, d/d, £179; 45-gal. 1-4 drums, £185.

Dioctyl Phthalate. In drums, 10 tons, d/d, per ton, £276; 45-gal. 1-4 drums, £282.

Ether BSS. 1-ton lots, drums extra, per lb., 1s 1d.

Ethyl Acetate. 10-ton lots, d/d, £137.

Ethyl Alcohol Fermentation grade (PBF 66 o.p.). Over 300,000 p. gal., 3s 10½d; d/d in tankers, 2,500- 10,000 p. gal. per p. gal., 4s 0½d. D/d in 40/45-gal. drums, p.p.g. extra, 2d.
Absolute alcohol (74.5 o.p.), p.p.g. extra, 2d.

Methanol. Pure synthetic, d/d, £40.

Methylated Spirit. Industrial 66° o.p.: 500-gal. and up. d/d in tankers, per gal., 5s 7½d; 100-499 gal. in drums, d/d per gal., 6s 0½d-6s 2½d. Pyridinised 66° o.p.: 500 gal. and up, in tankers, d/d, per gal., 5s 11d; 100-499 gal. in drums, d/d, per gal., 6s 4d-6s 6d.

Methyl Ethyl Ketone. All d/d. in 40/45-gal. drums, under 1 ton, £143 10s: 1-5 tons, £138 10s; 5-10 tons, £136 10s; 10 tons and up, £143; in 400-gal. tank wagons, £134 10s.

Methyl *iso*Butyl Carbinol. All d/d. In 5-gal. drums, £203; in 10-gal. drums, £193; 40-45 gal. drums, less than 1 ton, £168; 1-9 tons, £165; 10 tons and over, £163; in 400-gal. tank wagons, £160.

Methyl *iso*Butyl Ketone. All d/d. In 5-gal. drums, £209; in 10-gal. drums, £199; in 40/45-gal. drums, under 1 ton, £174; 1-5 tons, £171; 5-10 tons, £170; 10 tons and up, £169; in 400-gal. tank wagons, £166.

***iso*Propyl Acetate.** 10 tons, d/d, 45-gal. drums £132.

***iso*Propyl Alcohol.** Small lots: 5-gal. drums, £118; 10-gal. drums, £108; 40/45-gal. drums: less than 1 ton, £83; 1-9 tons, £81; 10-50 tons, £80 10s; 50 tons and up, £80.

RUBBER CHEMICALS

Carbon Disulphide. According to quality, £61-£67.

Carbon Black. GPF: Ex-store, Swansea. Min. 3-ton lots, one delivery, 7¼d per lb.; min. 1-ton lots and up to 3-tons, one delivery, 7¾d per lb.; ex-store, Manchester, London and Glasgow, 8¼d per lb. HAF: ex-store, Swansea; Min. 3-ton lots, one delivery, 8d per lb.; min. 1-ton lots and up to 3-tons, one delivery, 8¼d per lb. Ex-store Manchester, London and Glasgow, 9d per lb.

Carbon Tetrachloride. Ton lots, £83 15s.

India-Rubber Substitutes. White, per lb., 1s 4½d to 1s 7d; dark, d/d, per lb., 1s 0½d to 1s 4d.

Lithopone. 30%, about £57 10s for 5-ton lots.

Mineral Black. £7 10s-£10.

Sulphur Chloride. British, about £50.

Vegetable Lamp Black. 2-ton lots, £64 8s.

Vermilion. Pale or deep, 7-lb. lots, per lb., 15s 6d.

COAL TAR PRODUCTS

Benzole. Per gal., min. 200 gal., d/d in bulk, 90's, 5s 3d; pure, 5s 7d.

Carbolic Acid. Crystals, min. price, d/d bulk, per lb., 1s 4½d; 40/50-gal. ret. drums extra, per lb., ¼d.
MANCHESTER: Crystals, d/d, per lb., 1s 4d-1s 7d; crude, naked, at works, 8s 5d.

Creosote. Home trade, per gal., according to quality, f.o.r. maker's works, 1s-1s 9d.
MANCHESTER: Per gal., 1s 2d-1s 8d.

Cresylic Acid. Pale 99/100%, per gal., 12s. D/d UK in bulk: Pale ADF, per imperial gallon f.o.b. UK, 8s; per US gallon, c.i.f. NY, 103.50 cents freight equalised.

Naphtha. Solvent, 90/160°, per gal., 5s 3d. heavy, 90/190°, for bulk 1,000-gal. lots, d/d, per gal., 3s 11d. Drums extra; higher prices for smaller lots.

Naphthalene. Crude, 4-ton lots, in buyers' bags, nominal, according to m.p.: £22-£30; hot pressed, bulk, ex-works, £40; refined crystals, d/d min. 4-ton lots, £65-£68.

Pitch. Medium, soft, home trade, f.o.r. suppliers' works, £10 10s; export trade, f.o.b. suppliers' port, about £12.

Pyridine. 90/160, per gal., 16s 6d about.

Toluol. Pure, per gal., 5s 9d; 90's, d/d, 2,000 gal. in bulk, per gal., 5s 1d.
MANCHESTER: Pure, naked, per gal., 5s 6d.

Xylole. According to grade, in 1,000-gal. lots, d/d London area in bulk, per gal., 5s 9d-5s 11d.

INTERMEDIATES AND DYES

(Prices Normal)

m-**Cresol** 98/100%. 10 cwt. lots d/d, per lb., 4s 9d.

o-**Cresol** 30/31°C. D/d. per lb., 1s.

p-**Cresol** 34/35°C. 10 cwt. lots d/d, per lb., 5s.

Dichloraniline. Per lb., 4s 6d.

Dinitrobenzene. 88/99°C., per lb., 2s 1d.

Dinitrotoluene. Drums extra. SP 15°C., per lb., 2s 1½d; SP 26°C., per lb., 1s 5d; SP 33°C., per lb., 1s 2½d; SP 66/68°C., per lb., 2s 1d.

p-**Nitraniline.** Per lb., 5s 1d.

Nitrobenzene. Spot, 90 gal. drums (drums extra), 1-ton lots, d/d, per lb., 10d.

Nitronaphthalene. Per lb., 2s 5½d.

o-**Toluidine.** 8-10 cwt. drums (drums extra), per lb., 1s 11d.

p-**Toluidine.** In casks, per lb., 6s 1d.

Dimethylaniline. Drums extra, c.p., per lb., 3s 2d.

Market Reports

Active Trading with Good Export Inquiry

LONDON Active trading conditions have been maintained on the industrial chemicals market with the intake against contracts covering good volumes. Overseas inquiry continues at a satisfactory level. Sulphate of copper is reported in steady call for export, the price having further advanced to £85 per ton, less 2% f.o.b. Liverpool. Prices of industrial chemicals generally are unchanged and the undertone is firm.

Fertilisers continue in strong request to meet seasonal needs. Among the coal tar products, demand for the naphthalenes has been well maintained and there is a reasonably good demand for the light distillates.

MANCHESTER The Manchester market for heavy chemical products has fully recovered from the effects of the Easter holiday and steady trading conditions in most sections has been reported. Textile and other industrial outlets are mostly calling for good deliveries against contracts, and a fair number of fresh inquiries have been received. Prices generally are held. Compound fertilisers, superphosphates, and top-dressing materials are going steadily into consumption, and there is fair activity in the market for most of the light and heavy tar products.

SCOTLAND The level of business has again been fairly well maintained in the Scottish heavy chemical market. The week opened rather quieter due to the Easter holiday, but soon settled to normal conditions. Demands from most sections of the industry varied with quantities fully maintained, both for spot and contract requirements. There is also still considerable activity in agricultural chemicals. Little change in prices has taken place. Interest is still reasonably active in the overseas market.

People in the News

(*Continued from p. 725*)

president of the institute, which will be devoted to long range, basic research in the chemical and related fields. **Dr. R. F. Hudson,** former lecturer in chemistry at London University, is the first group director to start research at the institute. He will be joined this summer by additional European scientists.

● **Mr. R. C. Todhunter,** I.C.I. overseas director, has been elected a director of Canadian Industries Ltd. to fill the vacancy caused by the retirement of **Dr. Ronald Holroyd, F.R.S.,** a deputy-chairman of I.C.I.

● **Mr. D. H. Ward** is leaving the board of Francis H. Ward and Son Ltd. to devote his full time to his more recent appointment as managing director of the Ward Adams Co. Ltd. In future he will be based at Powder Mills, Leigh, Tonbridge, Kent, where the principal activities for the production of Waco polythene containers are being concentrated.

● Three university scholarships have been awarded by Pfizer Ltd. to **D. G. MacPhee** of Alloa (£330 a year for bacteriology at Edinburgh for four years), **M. J. Wilson** of Westgate (£465 a year for chemical engineering at Queens College, Cambridge, for four years), and **R. Steggle** of London S.W.13 (£465 a year for biochemistry at Pembroke College, Oxford, for four years).

● **Mr. J. F. M. Mowat** has been appointed a director of British Tar Products.

● **Mr. J. Linnell** has been appointed assistant sales manager of Q.V.F. Ltd., Stoke-on-Trent. He will retain his position of personal assistant to Mr. J. A. Window, sales director.

TRADE NOTES

Marinol Distributors

By arrangement with F. W. Berk and Co. Ltd., the Reddish Chemical Co. Ltd., Stanley Road, Cheadle Hulme, Cheadle, Ches., have been appointed sole distributors of Marinol bactericide to all industries. Made by Leda Chemicals Ltd., Edmonton, London N., Marinol will be distributed in non-returnable 1 or 5 gall. polythene bottles. Marinol is a 50% liquid concentrate of high molecular weight alkyldimethylbenzlammonium chlorides.

Correnda Tiling System

Correnda 'continuous tiling' system for walls and ceilings, application of which has been confined to contracting division of Corrosion Ltd., Southampton, has now been released for more general use. Following modifications, it is now said to be suitable for application by any qualified tradesman. The bonding agent has been modified to allow application without a special render material. Cost has been reduced.

Filmon Lucoflex

St. Gobain of Paris have produced a new sound-film entitled 'A material called Lucoflex', which deals with their p.v.c. material Lucoflex, its various uses and qualities. This one-reel 16-mm. film is available on loan from Claritude Ltd., 19 Dunraven Street, Park Lane, London W.1, to potential purchasers of p.v.c. sheeting, etc.

Anhydrous Sodium Metasilicate

Joseph Crosfield and Sons Ltd., Warrington, Lancs, who for many years have been manufacturers of Metso brand sodium metasilicate pentahydrate ($5H_2O$) are now also producing Metso brand sodium metasilicate in the anhydrous form. It is believed that due to the physical form and characteristics of the anhydrous metasilicate it will find uses in many new industrial applications and also for re-formulation purposes.

Barflo Literature

New literature dealing with single expansion units and all-plastics valves is available from Barflo Ltd., 56 Cavendish Place, Eastbourne.

Furno Industrial Gloves

Available from G. Waddington and Son Ltd., Newland, Hull, is a buyer's guide to the company's range of Furno industrial gloves and protective clothing. These gloves are said to combine the essential qualities of 'usability' and complete protection. The range covers many industries and has been the subject of research for many years by Waddington's, who have developed and steadily expanded the range, which now includes several hundred different types.

New Concrete Waterproofer

A new waterproofer for concrete products is being produced by Durham Raw Materials Ltd., 1-4 Great Tower Street, London E.C.3. The product, Durham Duroseal, an aluminium stearate, is a creamy white free flowing powder which is easily dispersed in the concrete mix to form an effective waterproofing agent. Tests are said to have shown a reduction in water absorbency of many times that of untreated material. Aluminium stearates can be used as surface waterproofers by peptising the soap in a suitable solvent such as kerosene or white spirit, and applying by brush or spray.

Rubber Antioxidant

An additional rubber antioxidant known as BHT has been added to the range available from Monsanto Chemicals Ltd., 10-18 Victoria Street, London S.W.1. It is said to be non-blooming and to confer a high degree of resistance to oxidation and copper degradation; and safe for use with foodstuffs.

Rosalex Resin-Removing Cream

A new resin-removing cream, introduced by Rozalex Ltd., 10 Norfolk Street, Manchester 2, is said to remove rapidly and effectively epoxide, urea formaldehyde, polyester, polyamide, phenol formaldehyde, polysulphide, silicone and other synthetic resins from the skin. The cream is rubbed thoroughly over the contaminated area until the resin is loosened and then wiped off with a clean cloth, or washed off with water.

Esso Butyl Rubber

The following technical information sheets bearing on various aspects of butyl rubber technology are now available from Esso Petroleum Co. Ltd., Chemical Department, 50 Stratton Street, London W.1; T.I.S. 21—a comparison of butyl and nitrile rubbers in light coloured appliance parts: T.I.S. 22, 23, 24 and 25; covering respectively vinyl-backed mastics, Enjay butyl vulcanisation with brominated resin, compression testing, automotive dynamic applications. T.I.S. 28; Enjay butyl for low-cost extrusion compounds.

Change of Name

Margam Benzole Co. Ltd., Waterloo House, 20 Waterloo Street, Birmingham 2, have changed their name to Port Talbot Chemical Co. Ltd.

DIARY DATES

MONDAY 2 MAY

C.S.—Cambridge: Chemical Lab., Lansfield Rd., 5 p.m. 'Acylation & phosphorylation mechanisms', by Dr. R. F. Hudson.

C.S. with R.I.C. & S.C.I.—Galway: Chemistry Dept., Univ. Coll. 'Some recent developments in explosives', by Dr. J. Craik.

C.S.—Cardiff: Chemistry Dept., Univ. Coll., Cathays Pk., 7 p.m. Meeting for reading of original papers.

S.C.I.—London: 14 Belgrave Sq., S.W.1., 6 p.m. London Section a.g.m. & 'Use of photography in industry' by Dr. H. Baines.

TUESDAY 3 MAY

Brit. Leather Mfrs.' Research Assn.—Egham: Milton Pk. Open days, until May 5.

Plastics Inst.—London: Wellcome Bldg., 183-193 Euston Rd., N.W.1., 6.30 p.m. London and District Section a.g.m.

S.A.C. with Iron and Steel Inst. and Inst. Metals.—London: Denison Hse., 296 Vauxhall Bridge Rd., S.W.1. Two-day symposium on 'Determination of gases in metals'.

S.C.I.—Dundee: Chemistry Lecture Theatre, Queen's Coll., 7.15 p.m. 'Fertilisers & food production', by Sir W. G. Ogg.

WEDNESDAY 4 MAY

I.Chem.E. with S.C.I.—Brighton: Dome, Royal Pavillion. Three-day international symposium on 'Distillation', 24th meeting of European Fed. of Chem. Engng.

THURSDAY 5 MAY

C.S.—London: Burlington Hse., Piccadilly, W.1., 7.30 p.m. Adolph Windaus Memorial Lecture by Prof. A. Butenandt.

FRIDAY 6 MAY

C.S.—Exeter: Washington Singer Laboratories, Prince of Wales Rd., 5 p.m. 'Insulin', by Dr. F. Sanger.

Two Treatments for Satin-etching

Two treatments for the satin-etching of aluminium have been developed by The Walterisation Co. Ltd., of Purley Way, Croydon. The first, Walterbryte H, is designed for heavy etching to remove extrusion or draw marks. The bath is made up by dissolving 90 gm. of Walterbryte H.1 salt in a litre of water. Operation is at 50°C, with an immersion time of five minutes.

One part of Walterbryte B.1 chemical is diluted in four parts of water for the second treatment. This removes less metal and is more suitable in cases where it is necessary to remove highlights from bright or polished aluminium. It gives a finish finer and brighter than the former method, and consequently can be combined with it to provide a superfine finish on materials showing pronounced draw marks.

Hedley's to Extend Research Laboratories

An extension to house the basic research department, the patents department and the basic research library is now under construction at the research laboratories of Thomas Hedley and Co. Ltd., Gosforth, Newcastle upon Tyne.

NEW PATENTS

By permission of the Controller, HM Stationery Office, the following extracts are reproduced from the 'Official Journal (Patents)', which is available from the Patent Office (Sales Branch), 25 Southampton Buildings, Chancery Lane, London W.C.2, price 3s 6d including postage; annual subscription £8 2s.

Specifications filed in connection with the acceptances in the following list will be open to public inspection on the dates shown. Opposition to the grant of a patent on any of the applications listed may be lodged by filing patents form 12 at any time within the prescribed period.

AMENDED SPECIFICATIONS

On Sale 24 May

Combating pests. Ciba Ltd. **775 085**

Purifying dimethyl terephthalate by distillation. Vereinigte Glanzstoff-Fabriken AG. **808 089**

ACCEPTANCES

Open to public inspection 1 June

Copolymers of vinyl acetate with higher vinyl esters. Distillers Co. Ltd. **836 243**

Process and apparatus for the regeneration of an ammoniacal liquid containing cuprous and cupric salts, used for removing carbon monoxide from gaseous mixtures under pressure. Bataafsche Petroleum Maatschappij N.V., De. **836 050**

Preparation of polymeric mixtures and compounds. British Rubber Producers' Research Association. [Addition to 832 193.] **836 053**

Wood coating method and products thereof. Dow Chemical Co. **836 054, 836 145**

Monoazo triazine dyestuffs. Imperial Chemical Industries Ltd. **836 248**

Process for recovery of polymers from solution. Phillips Petroleum Co. [Addition to 835 301.] **836 056**

3-Amino-6-substituted pyridazines and preparation of sulphanilamidopyridazines therefrom. American Cyanamid Co. **836 150**

Formation of coatings on beryllium and alloys. Pyrene Co. Ltd. **836 062**

Pressure vessels and seals. Babcock & Wilcox Co. **836 153**

Ion-exchange processes. U.K. Atomic Energy Authority. **836 155**

Fire-extinguishing composition. Pyrene Co. Ltd. **836 465**

Low-stress electrodeposited rhodium. Sel-Rex Corp. **836 475**

Polymeric materials containing adsorbed or absorbed antibacterial compounds. Imperial Chemical Industries Ltd. **836 477**

Differential refraction liquid level gauges. Yarnall-Waring Co. **836 172**

Production of benzoate esters. Monsanto Chemicals Ltd. **836 544**

Apparatus for continuously separating solids and liquids by filtration. Müller, H. K. [Addition to 802 255.] **836 266**

Substituted coumarones. Soc. des Laboratoires Labaz. **836 272**

Machines for mixing materials. Winget Ltd. **835 974**

Process for the production of finely divided ferromagnetic iron oxide. Deutsche Gold- und Silber-Scheideanstalt vorm. Roessler. **836 275**

Acetylenic compounds. Beecham Research Laboratories Ltd. **836 280**

Method and apparatus for the removal or recovery of vapours from air or other gases. Wheelabrator Corp. **836 282**

Method for adsorbing contaminating vapours from gaseous medium. Wheelabrator Corp. **836 283**

Process for producing titanium tetrachloride. Titan Co., A.S. **836 079**

Textured plastic materials. Monsanto Chemical Co. **836 080**

Method of separating non-ionised organic solutes from one another in aqueous solution. Dow Chemical Co. **835 977**

Process for the production of polymers of formaldehyde. Deutsche Gold- und Silber-Scheideanstalt vorm. Roessler. **836 288**

Two-stage method for preparing carbon-substituted piperazines. Wyandotte Chemicals Corp. [Addition to 781 701.] **836 289**

Heterocyclic amine compounds. Parke, Davis & Co. **836 083**

Method and means for dissolving gas into liquids. Ingenjorsfirman Fliesberg A.B., and Meyer, F. **836 294**

Photographic silver halide emulsions. Du Pont de Nemours & Co., E. I. **836 302, 836 089**

Polymerisation of ethylene and catalysts therefor. Soc. des Usines Chimiques Rhone-Poulenc. **836 305**

Preparation of hydrocarbon sulphonyl chlorides. Lubrizol Corp. **836 093**

Deacidification of ammonia water. Bergwerksverband GmbH. **836 315**

Stabilising additives for distillate fuels. Esso Research & Engineering Co. **836 323**

Camphidine derivatives and processes for their preparation. Pharmacia A.S. **836 325**

Synthetic fibrous paper-like products. Union Carbide Corp. **836 328**

Amino-acid hydrazides and a process for the manufacture of same. Hoffman-la-Roche & Co. AG., F. **836 332**

High melting polypropylene. Esso Research & Engineering Co. **836 333**

Preservation of aqueous dispersions of synthetic polymerised olefin substances. Dow Chemical Co. **836 335**

Weigh-hopper for use on pre-weighing machines for super-phosphate, fertiliser and the like. Kempthorn Prosser & Co.'s New Zealand Drug Co. Ltd. **836 343**

Preparation of 7-aminoheptanoic esters. Union Carbide Corp. **836 180**

Process for the preparation of carboxylic acids. Bataafsche Petroleum Maatschappij N.V., De. **836 525**

Halogenated phenylenedioxy dialkanols and a process. United States Rubber Co. **836 530**

Method for continuous measurement of difference between optical refractive indices of two liquids. Zeiss-Stiftung, C. [trading as Zeiss, C.]. **836 538**

Method of producing radiation sensitive, sintered bodies containing cadmium sulphide. Philips Electrical Industries Ltd. **836 541**

Propellant powders. Olin Mathieson Chemical Corp. **836 546**

Derivatives of benzoxalone-(2) and process. Chemische Werke Albert. **835 990**

Treatment of aqueous slurries. Mond Nickel Co. Ltd. **836 098**

Method of making an expansion joint for pipe lines. Badger Manufacturing Co. [Divided out of 836 209.] **836 210**

Process for boron hydrides. Farbenfabriken Bayer AG. **836 184**

Purification of liquid hydrocarbons. Bataafsche Petroleum Maatschappij N.V., De. **836 185**

Carrying out of heterogeneous exothermic reactions in the liquid phase. Institut Francais du Petrole, des Carburants et Lubrifiants. **836 187**

Processes for polymerising conjugated diolefins and the polymerised diolefins produced thereby. Bataafsche Petroleum Maatschappij N.V., De. **836 189**

Bleaching washing agents. Henkel & Cie GmbH. [Divided out of 833 361.] **836 108**

Unsaturated polyesters. Celanese Corp. of America. [Divided out of 836 436.] **836 438**

Open to public inspection 9 June

Processes of producing and recovering uranium enriched with U235. Kamen, M. D. **836 771**

Method of obtaining a plutonium concentrate from plutonium-containing uranium. Spedding, F. H., and Butler, T. A. **836 980**

Cleaning of uranium waste. United Kingdom Atomic Energy Authority. **836 570**

Solvent extraction of uranyl nitrate solutions. United Kingdom Atomic Energy Authority. **836 691**

Thermosettable epoxide resin compositions. Leicester, Lovell & Co. Ltd. **836 695**

Bleaching and detergent compositions. Unilever Ltd. **836 988**

Production of oxygen-containing organic compounds from alkenes. Imperial Chemical Industries Ltd. **836 989**

Metallic dispersions and organometallic catalysts. Dunlop Rubber Co. Ltd. **836 702**

High molecular weight copolymers of olefins with diolefins and process. Montecatini Soc. Generale per L'Industria Mineraria E Chimica. **836 790**

Filled polytetrafluoroethylene products and method for production. Polymer Corporation. **837 198**

Process and apparatus for dialkyl aluminium hydrides and aluminium trialkyls. Ziegler, K. **836 792**

Process for polymerising ethylene. Farbwerke Hoechst. **836 588**

Calcination of barium carbonate. Columbia-Southern Chemical Corp. [Addition to 759 821.] **836 797**

Monoazo dyestuffs of the benzene-azo-2-tetralol series and metal complexes. General Aniline & Film Corp. **836 995**

Method of stabilising polyolefines and compositions so obtained. Farbwerke Hoechst. **836 996**

Production of steroids. Olin Mathieson Chemical Corp. **837 281**

Manufacture of stabilised polyethylene. Farbwerke Hoechst. **836 803, 836 807**

Process for soluble polymers of vinyl and acrylic compounds. Wacker-Chemie GmbH. **836 999**

Process for linear, high polymers of α-olefins. Montecatini. [Addition to 828 791.] **836 814**

Liquid resinous organopolysiloxanes of increased viscosity. General Electric Co. **837 204**

Rotary filter provided with tilting filter pans. Dorr-Oliver Inc. **837 289**

Aluminium salts of substituted salicylic acids, and processes. Chinoin Gyogyszer Es Vegyeszeti Termekek Gyara, R. T. **837 290**

Process for very pure silicone. Wacker-Chemie GmbH. **837 205**

Production of titanium and titanium chlorides. Minister of Supply. **836 888**

Catalytic conversion of hydrocarbons. California Research Corporation. **836 715**

Butyl-type rubber compositions. Firestone Tire & Rubber Co. **836 716**

Production of phthalic acids. Imperial Chemical Industries Ltd. **837 006**

Basically substituted butyric acid amides and a process. Farbwerke Hoechst. **837 008**

Manufacture of vat dyestuffs of the dibenzpyrenequinone series. Farbwerke Hoechst. **837 298**

Process for crystalline high polymers of olefins. Montecatini. **837 301**

Process and apparatus for alkali or alkaline earth metal cyanides. Deutsche Gold- Und Silber-Scheideanstalt. **836 823**

Steroid compounds. Pfizer & Co. Inc., C. **836 724**

Dicarboxylic acid-monopiperazides and a process. Farbwerke Hoechst. **837 306**

Process for continuous gasification of hydrocarbon oils. Koppers GmbH., H. **837 211**

Process and apparatus for gasifying finely divided fuels. Koppers GmbH., H. **837 307**

Manufacture of condensation products of aminocarboxylic esters. Ciba Ltd. [Addition to 803 464.] **836 725**

Quaternary ammonium condensed phosphates. Imperial Chemical Industries Ltd. **837 011**

Process for optically active amino acids. Courtaulds Ltd. **837 216**

Process for phthalic acids. Imperial Chemical Industries Ltd. [Divided out of 837 006.] **837 007**

Process for glyoxal. Farbwerke Hoechst. **836 828**

Process for tertiary amino alcohols. Fahlberg-List Chemische Und Pharmazeutische Fabriken. Magdeburg Veb. **836 729**

Method of protecting active metals. Callery Chemical Co. **837 311**

Liquid gauges. British Oxygen Co. Ltd. **836 614**

Stabilisation of polymeric N-vinyl pyrrolidones with sulphurous acid or alkali metal salts thereof. General Aniline & Film Corp. **836 831**

Process of extracting and recovering columbium and tantalum from their ores. McCord, A. T. **837 110**

Methylenephenylvaleric acids and esters and preparation. Rohm & Haas Co. **837 220**

Process for telomerisation reactions. Deutsche Gold- Und Silber-Scheideanstalt Vorm Roessler. **836 895, 836 896 & 836 897**

Polymerisation products. Baker Chemical Co., J. T. **836 837**

Phosphate esters. Celanese Corp. of America. **836 732**

Steroids and manufacture thereof. Upjohn Co. **836 971**

Oxidation process for aromatic carboxylic acids. Imperial Chemical Industries Ltd. **837 321**

Aromatic amines. Pittsburgh Plate Glass Co. **836 733**

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SITUATIONS VACANT: *continued*

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There is a vacancy at the Nchanga Copper Mine in Northern Rhodesia for a routine Analytical Chemist at a starting basic salary at the rate of £94 9s. 6d. per month, in addition to which there is a fluctuating cost of living allowance which, at the present time, is about £5 10s. 0d. per month.

Applicants must be University Graduates in Chemistry or hold Higher National Certificate in Chemistry and have had at least two years practical experience in a Chemical Laboratory.

There is a cash bonus scheme which is related to the price of Copper and is, therefore, subject to variation. At the present time this bonus is about 30 per cent of basic salary.

There is also a contributory Pension Scheme and free Life Assurance is provided by the Company.

Leave is at the rate of 48 days per annum which may be accumulated up to three years entitlement and, in addition, there are five days local leave each year.

Accommodation for single men is available at once and for married men within about twelve months; the rent for married accommodation is approximately £5 per month for a house which is basically furnished and equipped with a Refrigerator. Until married accommodation is available, a housing allowance at the rate of £15 per month is payable. Medical services are provided by the Company for the employee and for his wife and family at a moderate monthly subscription.

The outward passage of the employee is paid by the Company.

Application forms can be obtained from:

Nchanga Consolidated Copper Mines Limited,
40 Holborn Viaduct,
London, E.C.1.

SITUATIONS VACANT: continued

TECHNICAL WRITER

A new appointment exists on the staff of the Research Director for a Technical Writer to compile and edit copy for publications on the Company's products and operations, including technical handbooks, pamphlets, advertisements, articles for technical and house journals and press releases. Collaboration with Sales and Publicity Departments will be necessary. It is essential that candidates can produce evidence of their ability to write good cogent English and compose suitable "copy" from basic technical information. A qualification in science or technology, and previous experience of technical writing for industry, is desirable.

Applications giving brief details of age, qualifications and experience should be submitted in writing, quoting ref. SKW/C.A. to: **Personnel Manager, Imperial Smelting Corporation Ltd., St. Andrew's Road, Avonmouth.**

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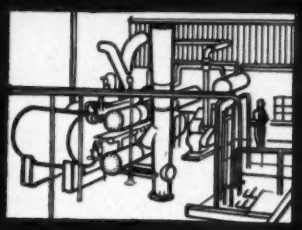

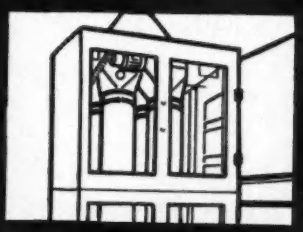

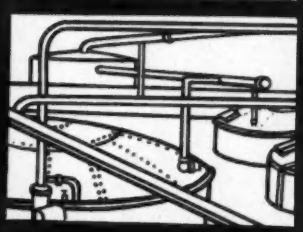

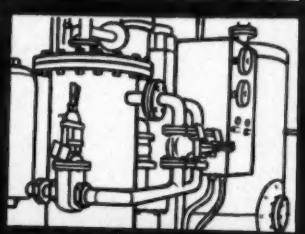

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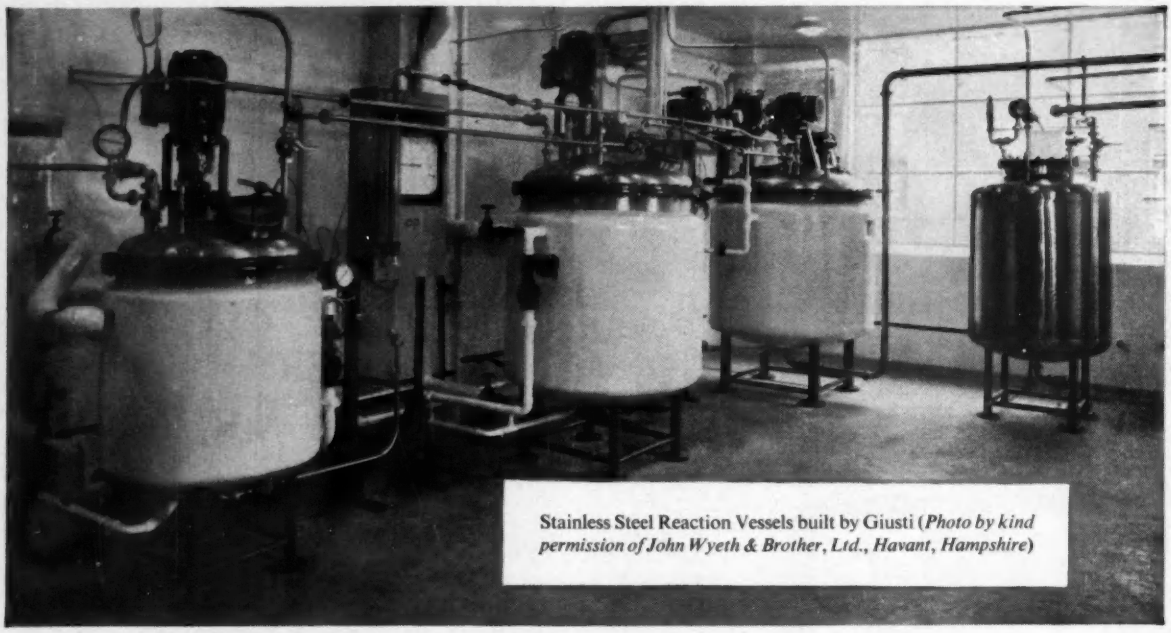

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A recent photo of stainless steel sterilizers made by Giusti and supplied to the M.W.B. Bacteriological Laboratories 25 years ago. (*Photo by courtesy of the Metropolitan Water Board*)

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